# Products Finishing

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OCTOBER 1951

# Saving Nickel

# Lea Copper-Glo

## Something New in Bright High Speed Copper Plating

The Ronal Bright Copper Process* using Lea Copper-Glo is the answer to the platers' prayers because it answers the problem of extreme nickel shortages.

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**Ronal Bright Copper Process is a development of Ronal Chemicals, Brooklyn, New York, for which process patents are pending.*

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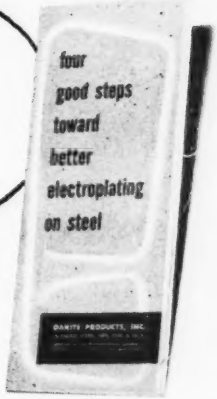
*See page 6* ▶▶▶




# This FREE New Booklet Tells You How

In its illustrated pages you'll find the answers to many questions that affect the success of your electroplating on steel. You'll want to read more about:

¶ Which costs more: good electrocleaning or poor electrocleaning? *See page 4.*

¶ How can cleaning costs be reduced 33⅓% while plating quality is being improved? *See pages 7 and 8.*

¶ What are four easy ways to improve the average rinse tank? *See page 10.*

¶ What rinsing fault is "an invitation to trouble" in the plating of high-carbon steel? *See page 11.*

¶ Why is it better to clean steel with reverse current than with direct current? *See pages 12 to 14.*

¶ What causes hydrogen embrittlement during electrocleaning? What is the remedy? *See pages 15 and 16.*

¶ One part chromic acid in 1,000,000 parts of cleaning solution—does that spell D-A-N-G-E-R? *See page 16.*

¶ How can an ordinary electrocleaning cycle be transformed into an exceptionally good cycle? *See Cycle E on page 23.*

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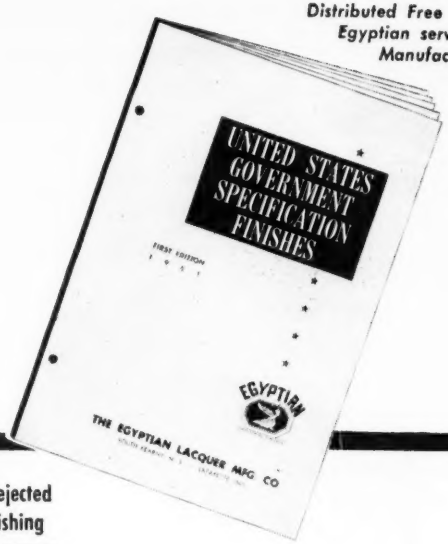


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# Products finishing

OCTOBER 1951
VOLUME 16 • NUMBER 1

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Pf editorial

Vol. 16, No. 1

OCTOBER, 1951

# Many Coats of Many Colors!

The forthcoming 63rd Annual Convention of the National Paint, Varnish and Lacquer Association and the 29th Annual Meeting of the Federation of Paint and Varnish Production Clubs lend emphasis to the fact that there are a sizable number of companies in the "paint business", and further, that an even greater number of paint, varnish, and lacquer finishing materials are available. Thus, the product finisher is confronted with a problem not found to such a degree in other fields; namely, that of selecting from the vast number of competitive products available, the proper ones to use in his finishing system or process.

The problem of finish selection is further complicated (perhaps simplified, in some cases) by the fact that finish manufacturers will formulate a special lacquer or enamel to fit individual customer needs, thus adding to the already large number of products available.

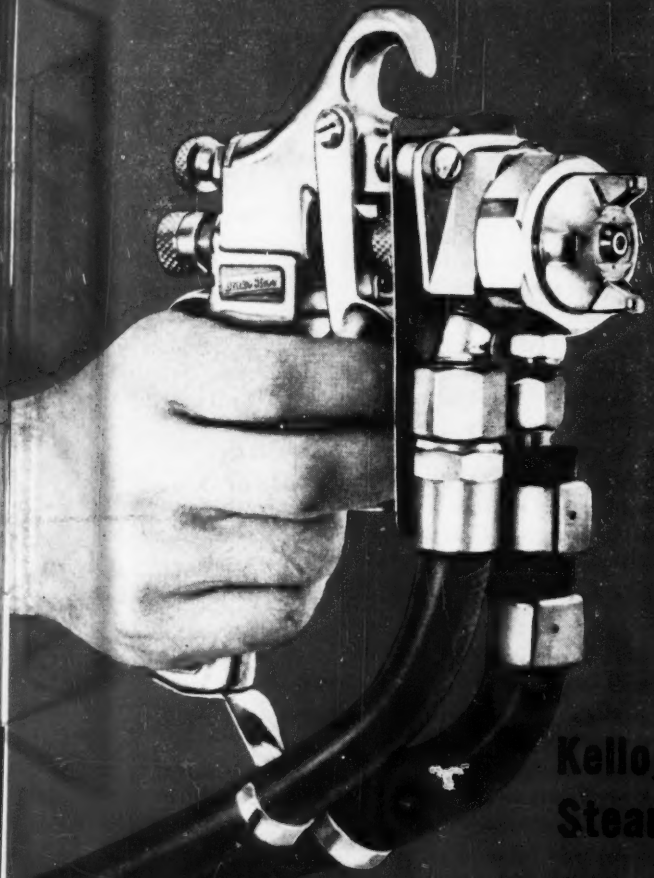
Yet under the proper conditions of application, MOST, if not ALL, of the paint finishes provide satisfactory surface protection under the service conditions for which they were formulated. Conditions or requirements ensuring a satisfactory finish might include the following:

1. Good base metal surface (not always easy to secure—particularly so at the present time).
2. Adequate and proper metal surface preparation.
3. Use of the correct type of primer coat (in most cases).
4. Thorough, complete control of the finishing process, including finishing materials, equipment, and all process operations.
5. Never-ending, enlightened, technical service by suppliers to solve day-to-day production problems and suggest improvements which will advance their customers' interests.

The consumer acceptance enjoyed by modern paint, enamel, and lacquer finishes is a tribute to the versatility, ingenuity, and cooperative efforts of production finishers, finish engineers and paint chemists, manufacturers and suppliers, and technical service representatives. That's the team responsible for today's outstanding paint finishes.

# STEAM SPRAYING

# DOUBLE THICK . .



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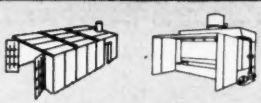

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# PUTS ON PAINT . DOUBLE QUICK

Steam Spraying makes possible tremendous savings for industry by reducing finishing costs. Dry, superheated steam, used in place of compressed air, permits the use of higher viscosity paint because paints heated to approximately 165°F. tend to have the same viscosity. This factor alone can cut costs by reducing the amount of thinner or solvent normally required. And because the thinning is done by heat the paint returns to its original higher viscosity on contact with the surface being painted. This means that thicker coats (up to 2 mils) can be applied *in one pass of the gun!* There's your TIME and LABOR saver.

Production line tests show that these savings are available at no cost to the quality of the finish. Steam Spray IMPROVES the application of thicker coats: Dissipating steam reduces overspray usually caused by bouncing air; cooling steam contracts, eliminating popping caused by trapped air expanding under a layer of paint. At similar pressures, Steam Spray handles a higher viscosity material than does compressed air to produce a thicker coat—free of sags and runs. Specific operating advantages like the following demonstrate that this new method probably can save you considerable time and money in your finishing operation.

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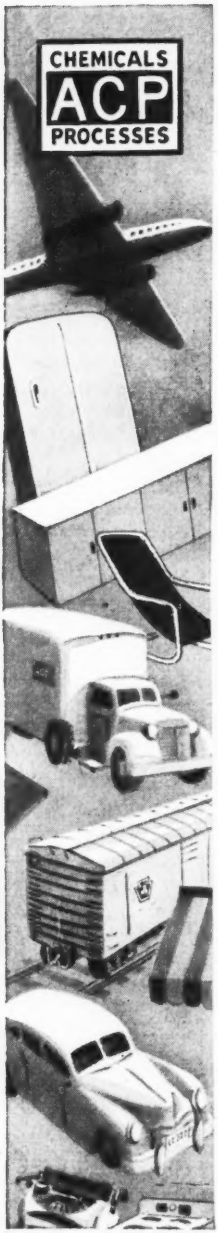


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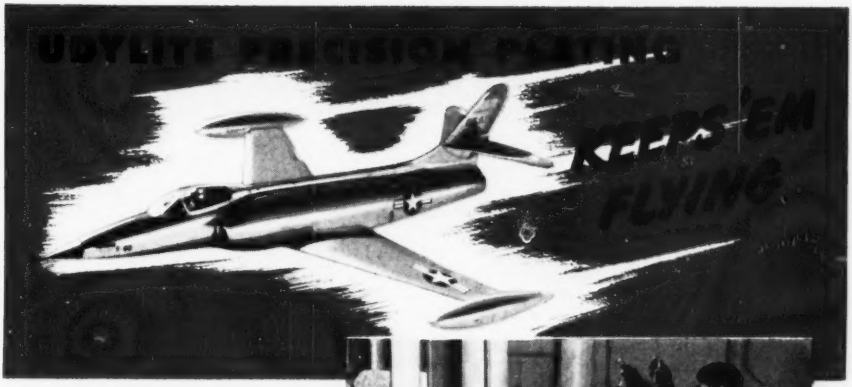


**SCINTILLA MAGNETO DIVISION OF BENDIX AVIATION CORPORATION USES UDYLITE EQUIPMENT AND PROCESSES TO SAFEGUARD VITAL AIRCRAFT IGNITION PARTS**

Udylite plating installation at Scintilla Magneto Division of Bendix Aviation Corporation showing ignition connectors of the Lockheed F-90 Fighter being processed.

Spark of life to military aircraft—both jet and propeller driven—is the electrical system. Failure can be fatal, so the Scintilla Magneto Division gives the metal of ignition connectors a protective coating against rust and corrosion with Udylite plating equipment and processes.

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PIONEER OF A BETTER WAY IN PLATING

# A Versatile Production

**Serving as a government approved and certified electroplating and finishing shop for the Middle Atlantic area, the job finishing plant of Allied Research Products, Inc., also provides facilities for testing the products and processes, distributed by the company, under actual production conditions. The same facilities provide the company with a basis for study of existing processes, with a view towards developing improved methods of finishing to benefit the entire industry.**

By **JULES HORELICK**
Plant Manager

THE job finishing plant of Allied Research Products Inc. contains a wide variety of metal finishing facilities: still plating processes include zinc, cadmium, copper, nickel, chromium, tin and silver; semi-automatic facilities are available for plating zinc; zinc, cadmium, copper, tin and nickel can also be plated from barrel lines. In addition, Allied is equipped to apply such chemical coatings as Iridite, Bonderite, phosphates and black oxides to all metals. Since the company manufactures the nationally known line of Iridite finishes, the job shop naturally specializes in the application of these coatings to zinc, cadmium and aluminum parts.

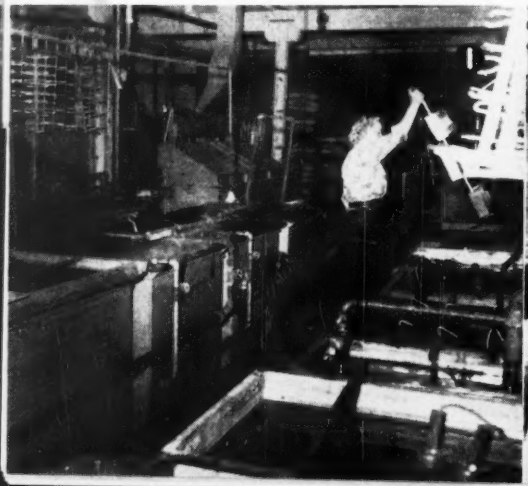
In conjunction with the plating department, there is a paint section where synthetic enamels and lacquer finishes can be applied to customer specifications. specifications.

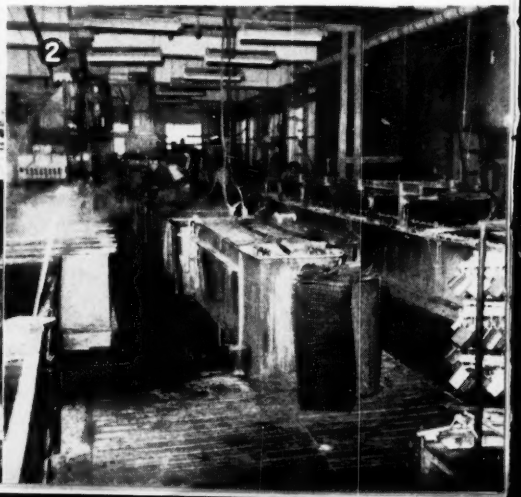
Other equipment is devoted to specialized treatments for aluminum: Iridite No. 14 (Al-Coat) and both the sulfuric and chromic acid electrolytic anodizing processes.

Following are details of many of the finishing cycles used together with descriptions of the work flow through each type of finishing.

## Aluminum Finishing

Sheet aluminum, castings, or machined parts can be anodized or protected with Iridite No. 14 (Al-Coat). These include ice cube tray compartments,



# Finishing Plant

Fig. 1—A view of the aluminum finishing unit. The sulfuric acid anodizing tank is at the left rear of the photograph. In the center background may be seen the chromic acid anodizing tank. Rinse tanks and dryer are in center foreground. Iridite No. 14 (Al-Coat) processing tanks at right.

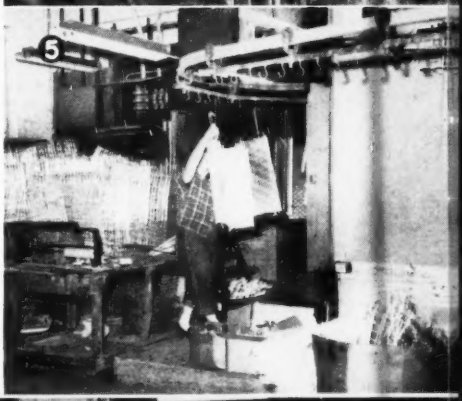
Fig. 2—Overall view of zinc plating area. Parts, racked for plating, may be noted in right foreground. Semi-automatic zinc tank is in right background.

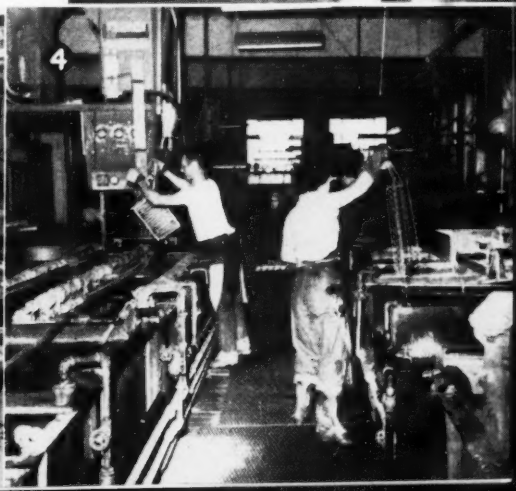
Fig. 3—Operator removes zinc plated work from semi-automatic plating machine. Controls and meters may be seen on panel board at left of operator. Udylite bright nickel tank is in foreground.

Fig. 4—At right, operator may be seen carrying zinc plated parts through Iridite bright dips. At left, plater is unloading bright nickel plated parts.

Fig. 5—A view of the unloading end of dryer for all products plated on racks.

Fig. 6—A barrel load of zinc plated parts is unloaded in a two-compartment transfer chute. This device automatically divides the barrel load in half so that each basket into which the parts fall will be equally loaded. This setup creates a condition for minimum drag-in of water into the Iridite dips (right foreground).





radar tubing, and accessory equipment, prosthetic devices, radar cases and cans, machine gun housing parts, canister parts for gas masks, gas mask eye rings, and others.

The process for anodizing various products by the sulfuric acid method is as follows:

1. Alkali clean (either etching or non-etching cleaner).
2. Water rinse.
3. (For castings) Hydrofluoric-nitric acid pickle to remove silica.
4. Water rinse.
5. Chromic acid pickle.
6. Water rinse.
7. Anodize for about 30 minutes in 18 per cent sulfuric acid, held at 70 deg. F. Current density approximately 12 amp./sq. ft. Air agitation. An 18-volt, 3,000-ampere rectifier supplies power for this process.
8. Thorough running water rinse.
9. Seal for 10 minutes in clear water at 200 deg. F.

9a. (Alternate) Seal in potassium dichromate solution.

10. Dry in hot air dryer.

As can be noted by reference to Fig. 1, the aluminum finishing department is a compact, well arranged unit, so designed that material flow follows the general shape of a U. Loading and unloading of racks are thus accomplished at the same location, and lost motion is held to a minimum.

The construction of the 18-foot long, 2-foot wide and 5-foot deep anodizing tank is a matter of interest. Inside a steel tank a single lead wall forming the sulfuric acid anodizing tank proper is suspended, separated by a water chamber from the steel jacket, and properly braced by supporting members. Regular city water circulates through this water jacket and cools the anodizing solution and, at the same time, supports the lead tank wall. This lead wall serves as the cathode in the anodizing process. The circulating water then passes through the water rinse tanks so that it is, in reality, used twice—once for cooling, and once for rinsing.

Anodizing by the chromic acid process is specified for aircraft assemblies, for example, and is accomplished by a process similar to that described for sulfuric acid anodizing. Instead of Step 7, a solution of 10 per cent chromic acid, air-agitated, at 95 deg. F. is used. This solution is operated in a hooded steel tank. Parts are anodized 30 minutes with a reverse current of about 3 amp./sq. ft. at 40 volts. Preliminary treatments, as well as sealing and drying, are the same for sulfuric acid anodizing.

The dryer used in this department consists of a deep

Fig. 7—With the aid of an overhead hoist, a basket of parts is dipped in the Iridite bright dip. The Kreider dryer may be seen in right background.

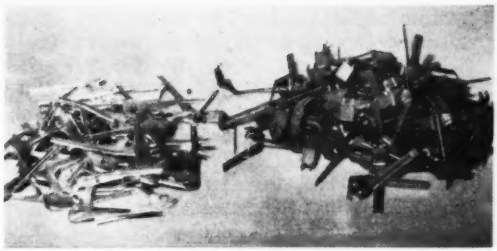


Fig. 8—Parts at left are Iridite bright zinc; parts at right are finished in Iridite olive drab coating.

steel tank into the bottom of which a Modine steam space heater blows hot air. Parts, while still racked, are hung in the tank and dry thoroughly in a short time.

Aluminum parts are also treated by the Iridite No. 14 (Al-Coat) process in this department. This process consists of the following steps:

1. Alkali clean (etch or non-etch type), or other cleaning process.
2. Water rinse.
3. Acid clean or pickle is necessary.
4. Water rinse.
5. Dip in Iridite No. 14 (3 oz./gal.) for 10 seconds to 3 minutes. Temperature 75-95 deg. F.; pH 1.5 to 1.7.
6. Water rinse.
7. Clean, hot water rinse.
8. Dry in warm air current.

The Iridite process forms a chromate gel on the aluminum surface. This coating serves as an excellent corrosion-resistant coating as well as a base for various clear or opaque paint and lacquer finishes. Such final finishes may or may not be applied according to the particular finish system specified.

Where aluminum products are required to have a hard heavy surface to resist wear, the electrolytic anodizing processes are used. Whereas, the electrolytic process provides an oxide surface, Iridite provides a chromate surface that is not hard but yet provides effective protection even if the Iridited surface is scratched.

### Semi-Automatic Zinc Plating

Parts such as deep freeze baskets, display racks, oven racks, flare bomb fins, drawer slides for kitchen cabinets, and wrenches are coated in a zinc plating installation that starts with unplated parts at one side of the shop, and runs through a straight-line setup so that the finished products may be packed for shipment at the opposite side of the plant. Figure 2 is a view of a portion of the zinc plating installation.

The cleaning, pickling, and zinc plating cycle for steel parts varies in accordance with the condition of the basic metal surface and the finish specified. Facilities are available so that the following cycle can be used if desired. Some steps in the cycle can be eliminated if the condition of the metal warrants such action.

1. Soak clean in 6 oz./gal. solution of Pennsalt 34 held at 180 deg. F.
2. Electroclean in reverse current cleaner (10 oz./gal.) operated at 180-200 deg. F.
3. Water rinse.
4. Pickle in hot 7 per cent sulfuric acid. Steel tank interior is lead lined and further protected with a wood lining.
5. Water rinse.
6. Electroclean as in Step No. 2.
7. Water rinse.
8. Dip in cold, 12 per cent muriatic acid.
9. Water rinse.
10. Dip in sodium cyanide solution.
11. Zinc plate in 3400-gallon semi-automatic plating machine.

The bright zinc solution ingredients and operating conditions are as follows:

| | |
|---|---|
| Zinc cyanide | 8 oz./gal. |
| Sodium cyanide | 5.6 oz./gal. |
| Caustic soda | 10.4 oz./gal. |

Sodium sulfide ..... 1/15 oz./gal.
ARP No. 3
Brightener ..... 4 oz./100 gal.
Temperature ..... room
Current density .. 20-40 amp./sq. ft.

As can be noted in Figs. 2 and 3, the Udylite semi-automatic zinc plater can be used as a still tank (for plating large objects) or in the usual fashion. The zinc solution is kept cool by cooling coils through which water is circulated before it flows through one of the many water rinse tanks. Power for the zinc tank is furnished by a 6,000-ampere, 9-volt generator, force ventilated with filtered air, and shown as the right background in Fig. 2 and the left background in Fig. 3.

After racks of parts complete the 7-minute zinc plating cycle, during which a coating of zinc 0.0002 inch thick is deposited, they are removed, as shown in Fig. 3, and rinsed thoroughly in two water rinses. From this point on, parts may receive one of several final finish treatments. If a mirror bright finish is desired, the process is as follows:

1. Dip in a solution of Iridite No. 4-2.
2. Water rinse.
3. Bleach in phosphoric acid 3.8 cc./gal. held at room temperature.
4. Water rinse.
5. Hot water rinse.

In Fig. 4, an operator is shown starting a rack of parts through the bright dipping cycle.

If a bright iridescent finish on the zinc is desired, the treatment following zinc plating is as follows:

1. Dip in Iridite No. 8P solution.
2. Water rinse.
3. Bleach in sodium carbonate 2-3 oz./gal. held at 120-130 deg. F.
4. Water rinse.
5. Hot water rinse.

To produce on zinc plated ware an olive drab specification finish, the following cycle is used:

1. Dip in Iridite Olive Drab No. 1.
2. Water rinse.
3. Hot water rinse.

For a bright, iridescent yellow zinc surface, parts are processed as follows:

1. Dip in Iridite No. 4-2 solution or Iridite No. 8P.
2. Water rinse.
3. Hot water rinse.

Plated and treated parts are hung for drying on an endless, overhead, monorail conveyor which loops through a tunnel dryer. Heat is supplied to the dryer by a steam space heater mounted on top of the tunnel. As racks leave the dryer, finished parts are unloaded, inspected, and packed for shipment, as shown in Fig. 5.

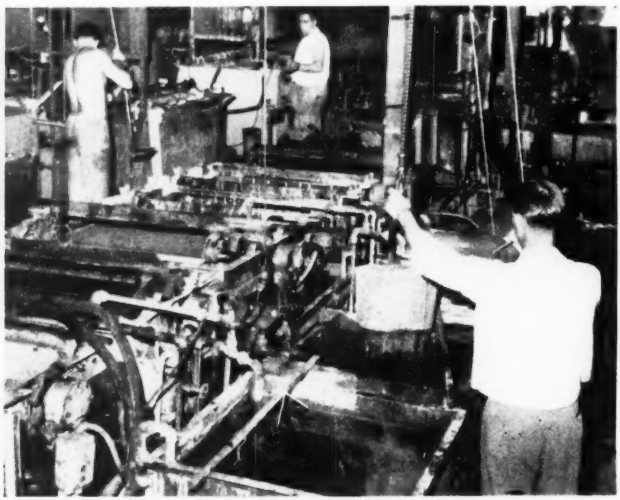


Fig. 9—A view of the barrel tin plating unit. Note compact arrangement of piping.

Plating racks employed in the various plating processes are constructed and insulated in the plant. Racks are dipped in Bunatol rack coating and baked at 350 deg. F. to form the rack insulating coating.

**Barrel Plating**

Products so shaped that they may be handled conveniently in plating barrels are routed through one of two U-shaped or hairpin barrel plating installations. Barrels are transported from tank to tank with an electric hoist suspended from a monorail conveyor. In one unit, parts to be zinc plated are routed as follows:

1. Load in No. 316 stainless steel baskets or Monel barrel.
2. Clean by tumbling in Pennsalt cleaner (6 oz./gal.—190 deg. F.) for 15 to 30 minutes.
3. Water rinse.
4. Pickle in hot sulfuric acid or cold muriatic.
5. Water rinse.
6. Transfer to 36-inch, melamine or Lucite plating barrel.
7. Plate in 450-gallon, 3-station Udylite barrel plating machine for 15 minutes to 3 hours (depending on thickness required).

Platecoil heating and cooling coils maintain the zinc plating solution at just above room temperature. Power is furnished by a 12-volt, 2,000-ampere generator. The zinc solution is similar to that described for the semi-automatic zinc tank. In this solution ARP No. 5 Brightener is used.

8. Cold water rinse. (Drilled pipe nipples at intake side of rinse tanks improve rinsing and keep water surface clean.)
9. Transfer to stainless steel wire baskets as shown in Fig. 6.
10. Dip in Iridite No. 8P or Olive Drab No. 1 (Fig. 7).
11. Water rinse.
11a. Iridite No. 8P (Blue bright coating) Bleach in 3 oz./gal. caustic soda. (optional)
11b. Water rinse.
12. Dry in steam heated Kreider centrifugal dryer.

In Fig. 8 Iridite bright zinc parts are contrasted with Iridite Olive Drab zinc plated parts. Brass parts are barrel plated with copper and tin in a barrel setup quite similar to that just described and located adjacent to it, as can be seen in Fig. 9. The process is as follows:

1. Vapor degrease.
2. Tumble clean for 5 minutes.
3. Water rinse.
4. Plate with 0.0002-inch thickness of copper in Rochelle cyanide copper solution.
5. Store in water and transfer to tin plating barrel.
6. Plate in one of two 375-gallon bar-

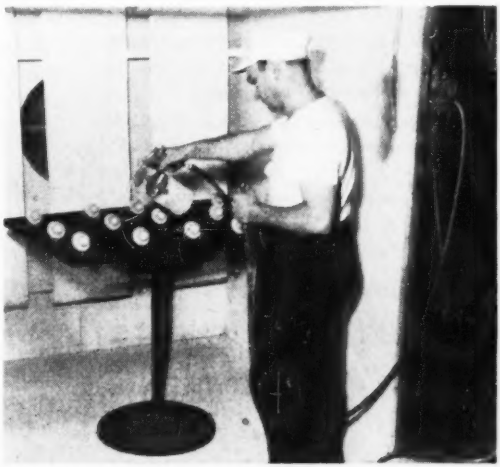


Fig. 10—View of a typical setup for spray painting on a job or experimental basis.
*(PRODUCTS FINISHING Staff Photos)*

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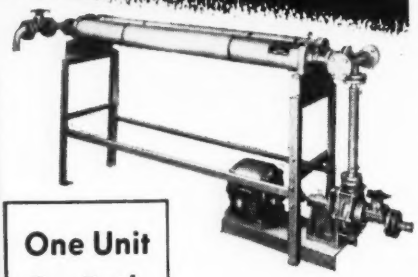

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rel tin solutions to obtain 0.0002-inch thickness of tin. The size of the barrel load is a critical factor in order that parts do not nest and good coverage is obtained. The solution and operating conditions are:

| | |
|---|---|
| Sodium stannate | 20 oz./gal. |
| Caustic soda | 2.5 oz./gal. |
| Sodium acetate | 3.0 oz./gal. |
| Hydrogen peroxide | 1/16 oz./gal. |
| or | |
| Sodium perborate | 1/16 oz./gal. |
| Temperature | 160-180 deg. F. |
| Voltage | not less than 6 volts |

7. Cold water rinse.
8. Hot water rinse.
9. Dry in Kreider centrifugal dryer.

**Miscellaneous Finishes**

Black oxide coatings are applied to certain defense products by the following process:

1. Electroclean in reverse current alkali cleaner.
2. Water rinse.
3. Scrub with pumice stone and water (optional).
4. Soak in sodium cyanide (8 oz./gal.).
5. Suspend in Ebonol S-30 for 30 to 60 min. This solution is operated at 300 deg. F. in a gas-fired, steel-jacketed steel tank.
6. Cold water rinse.
7. Dip in hot soluble oil.
8. Pack for shipment.

Also available are a 335-gallon chromium tank, a 250-gallon tin tank, a 300-gallon cadmium tank, as well as silver tanks and a plating barrel for nickel.

A 1,000-gallon Udylite bright nickel tank (foreground Fig. 3) is used for bright nickel plating. The solution is operated at 120-130 deg. F. Cathode rod agitation is employed, and power is furnished by a 1500-ampere, 6-volt rectifier. The cleaning and plating process follows conventional practice. A short strike in a MacDermid bright copper solution is used prior to the bright nickel plating.

# *Presenting*

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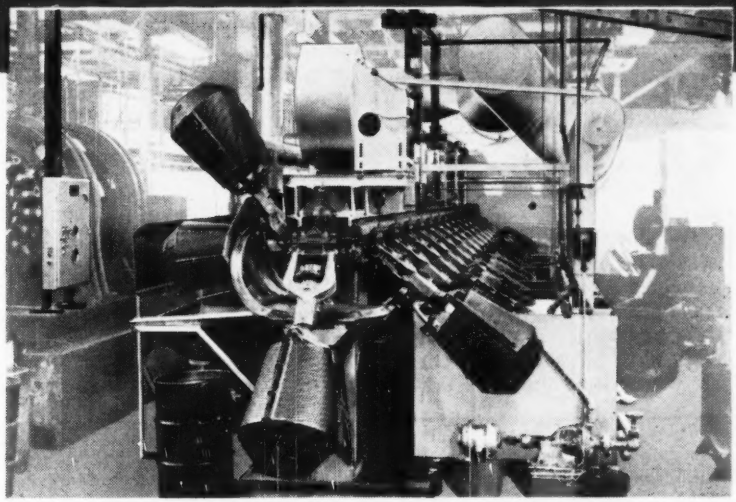

Imagine one man processing 16,000 pounds in eight hours! That is what this new Stevens plating machine can do for you. Like the famous Stevens Model "C," the new Model Super "E" can be used for Cleaning, Pickling, Plating and Drying —and it will automatically unload the processed parts. All you do is load it—manually or automatically.

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*Be sure to visit the Frederic B. Stevens exhibit and see this machine in operation at the National Metal Exposition and Congress at Michigan State Fair Grounds in Detroit, October 15 through 19. Booths 330, 336 and 342 in Building "D."*

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As has been noted, paint finishes are applied if specified. Figure 10 is a view of the spray booth. A batch-type oven is available for processing baked coatings.

In addition to the logical, efficient arrangement of plating equipment, mechanical material handling equipment speeds production. Boxes of parts are handled on pallets by gasoline fork lift trucks, and can be tier-stacked if necessary. An elevator lift to the loading dock makes truck loading easy. As can be noted in the plant photographs, exhaust pipes, plumbing, and electric lines are installed between tanks and below the tank working level. This adds materially to shop appearance. All drains are piped to a central sump so that waste products have an opportunity to neutralize one another before they are discharged.

All plating solutions are analyzed regularly and the results are charted in such a way that statistical quality control of the process may be achieved. Regular routine plate thickness tests are made on a Magne-gage. Likewise, salt spray tests are conducted in a room at a controlled temperature in two salt spray cabinets built to National Bureau of Standards specifications.

By these means, specification finishes can be obtained on a production basis. The company assists its customers further by working with them to establish proper and adequate specifications, and performs such experimental work as is necessary to arrive at sound conclusions.

---

More than 800,000 ingot tons of stainless steel were produced in the United States in 1950, an all-time peak. The percentage of this stainless represented by nickel-bearing grades was reduced from two-thirds to approximately 55 per cent, and yet the actual tonnage of nickel-containing alloy exceeded both 1948 and 1949.

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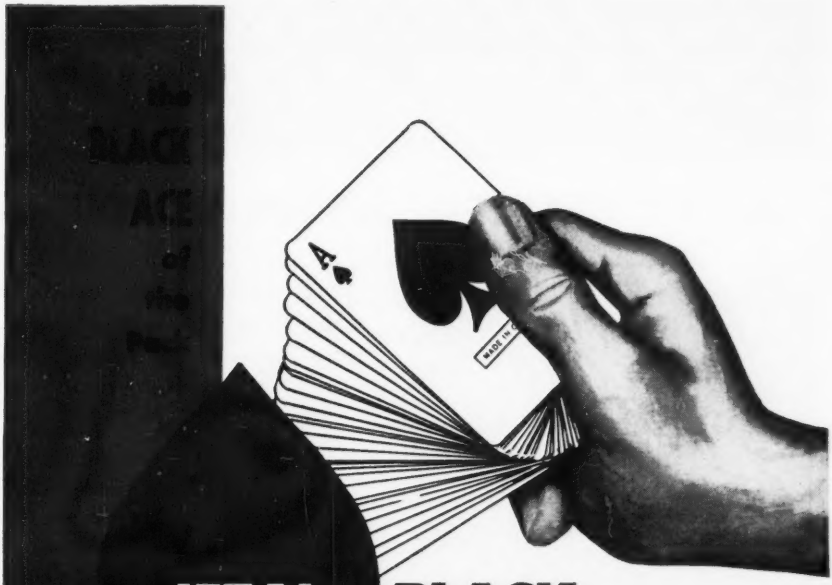


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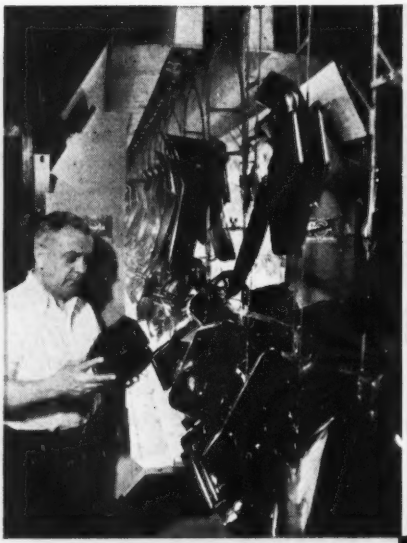

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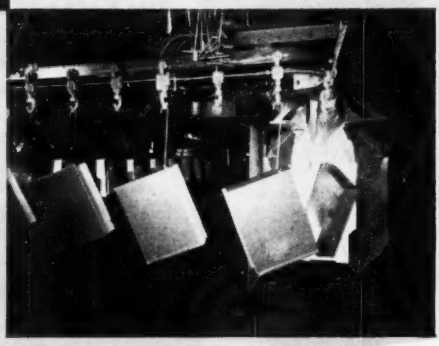

This installation at Peerless Mfg. Co., Louisville, is a 54'4" Fostoria infra-red oven for baking brown hammer enamel on stove parts. Baking time is 4½ minutes at approximately 350°F. Before installing this Fostoria oven, the parts were baked in a batch type gas oven for 30 minutes. Fostoria time saving 85%.

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# Modern Hot-Dip Galvanizing

By RAYMOND F. LEDFORD
Hanson-Van Winkle-Munning Company

HOT dip galvanizing is one of the oldest forms of coating iron with a dissimilar metal as a rust preventive, and today, as for some years past, these operations account for the largest single consumption of slab zinc in this country. The discussed shortage of zinc, a result of uncertain international disturbances, will undoubtedly be felt by all galvanizers. Therefore, this is an excellent time to review present methods employed in hot dip galvanizing with a view toward stretching the available supply of zinc to cover a greater area. This can be accomplished by: (a) reducing waste, the largest part of which is attributed to the formation of dross, and (b) improving the quality of the coating, thereby reducing rejects and the amount of work that must be refinished. It invariably comes as a pleasant surprise to those making such an investigation to discover that many steps responsible for the reduction of dross and other waste will at the same time improve the quality of the work produced. The foregoing comments give purpose and direction to this article, wherein methods for producing suitable coatings with a minimum of loss will be outlined.

The hot galvanizer's constant problem is to convert the maximum amount of zinc into the most serviceable coatings. Loss of metal as zinc oxide, flux skimmings and dross must be kept at a minimum. The oxide or build-up of ash can be reduced by covering up as great a portion as possible of the surface of the zinc. This is accomplished by the intelligent use of the flux blanket or using permanent covers where practical, and sometimes, a combination of the two. In all classes of work the flux blanket is desired, and it should be noted that products producing the lowest loss due to oxide are those classes of products that are processed in such a manner as to have the largest area of the zinc covered. In some operations the loss from the formation of zinc oxide may run as high as 30 per cent; this condition exists where products are processed in such a manner as to have the greater portion of the zinc surface exposed to the air. In the first condition described, the loss from zinc oxide is usually in the order of 7 per cent.

Dross is the most formidable foe. Dross is a zinc-iron compound formed by the reaction of the zinc on the kettle, or on the work being processed, through the introduction of iron in the spelter used and particularly the carry-over of iron salts with the work. On some classes of work the dross formation has accounted for as high as 40 per cent of the spelter used. If you were to consider this maximum figure for loss of spelter through the formation of dross and the maximum figure for loss of zinc through the formation of the oxide, you can readily see that with some operations only a portion of each pound of zinc melted in the kettle comes out in the form of a satisfac-

tory coating on the work being processed. While it is not possible to eliminate dross entirely, it is nevertheless possible to reduce the amount of zinc lost in this manner, with the result that more zinc will be available for coating the ware.

The formation of dross attributed to the reaction of zinc on the kettle containing the molten metal has been a subject of concern for some years. Today kettles are designed for the proper ratio of molten zinc to parts being processed, as well as improved methods of firing the kettle. In many plants the proper kettle design and heat application, along with proper preparation of the work, has reached the point where the major source of iron to form dross is the iron that is dissolved in the zinc in producing the alloy layer necessary to secure proper bond.

Over-firing, that is, operating the zinc at elevated temperatures, has a pronounced effect upon iron solution as shown in Fig. 1[1]. Some operators have felt it necessary to operate at higher temperatures in order to increase fluidity; however, this characteristic can be obtained by less costly means than increasing temperature.

There is also some attack on the work being processed. If you were to immerse a piece of steel in the molten zinc and immediately withdraw it, allowing only the briefest immersion time, you would find that the object would be covered with a non-adherent coating of zinc. If, however, you were to increase the immersion time, you would find that the coating would be more adherent. The adhesion is a factor of the formation of the zinc-iron alloy at the interface of the steel. The outer layer of the coating is zinc. Too long an immersion time results in too thick an alloy layer, which results in rough coatings with many grades of steel and, invariably, brittle coatings. With the longer immersion time it has been found that during the reaction of the zinc with the iron some of the iron is washed off and reacts with the zinc in the kettle to form dross. This compound, being heavier than the zinc, sinks to the bottom of the kettle. Constant working of the spelter causes the dross to settle out on the work, which results in rough, unsatisfactory coatings. When we recognize that dross crystals contain only about 6 per cent iron, we can visualize the small amount of iron necessary to produce a substantial amount of dross. The effect of time of immersion is well illustrated in the malleable pipe fitting field where many

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In 1943 Mr. Ledford joined the Hanson - Van Winkle - Munning Company, serving as sales engineer in the Chicago office.

Mr. Ledford is a member of the American Electroplaters' Society, The Electrochemical Society, the American Society for Testing Materials, and the American Ordnance Association. He has been an active member of the Chicago Branch of the A.E.S., and is serving currently as its president. He is also publicity chairman for the 1952 A.E.S. Convention to be held in Chicago.

manufacturers have established systems based on an immersion time of less than 1½ minutes, whereas other galvanizers in this field neglect the time element and the work remains in the kettle about 3½ minutes or longer. This latter group converts about 60 per cent of the spelter to dross and the former group converts 25 to 30 per cent of the spelter to dross, with other operating conditions being comparable. In reducing the amount of dross build-up attributed to work being processed, and for the most ductile coatings, it is recommended that immersion time be as short as possible.

The carry-over of iron salts on the work being processed is responsible for a large percentage of the dross formed in the galvanizing operation. Older methods involve little or no cleaning of the base metal. After acid pickling, which is invariably a hot sulfuric acid solution, the work is washed off in water and then transferred to a muriatic acid dip. Some of the oxides that are not removed in the preceding pickle are removed in the muriatic acid. From the muriatic acid the work is transferred to the kettle. There are many disadvantages of this system, which principally involve less adherent, more brittle coatings, spotty coatings, and the tendency on the part of the operator to permit the iron in the muriatic acid to build up to an excessive point, with the result that these salts are transferred with the work to the kettle to form more dross. The iron in the muriatic acid dip is usually dumped when it reaches a concentration of 2 to 3 per cent. During the transfer period from the muriatic acid dip to the kettle the film on the work continues to be active. Observations have shown that ferrous chloride on a given area of work increases at least ten times over that present as dragout from the muriatic acid tank on only a few minutes' exposure before going into the zinc kettle. Under this system sal-ammoniac was used as a kettle flux, volatilizing at a low temperature resulting in an unstable fusion and greater loss from skimming.

Due to the simplicity of the operation, care in preparation of the base metal and attention to the fundamentals of the reaction have been neglected. While this neglect does not always result in failure it does increase cost, reduce quality and restrict the usefulness of the product. The preparation of the work for galvanizing is of tremendous impor-

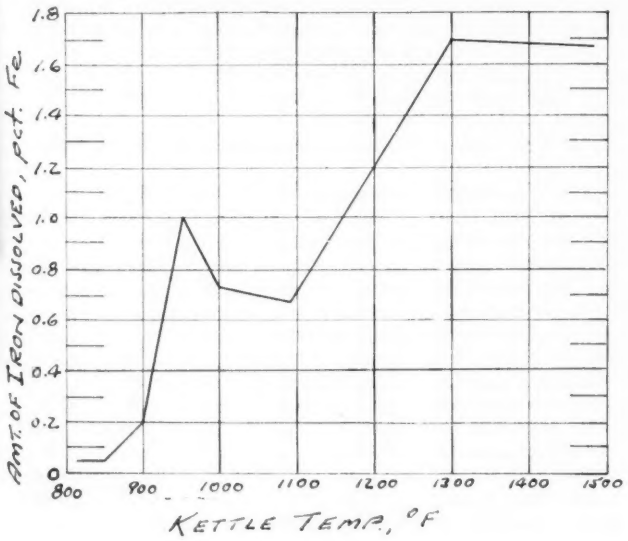


Figure 1

**TABLE I**

SURFACE TENSION

| *Material* | *DuNouy Value—Dynes* |
|---|---|
| Zinc Ammonium Chloride | 60.3 |
| No. 20 Flux | 50.2 |

Test solutions contain 350 grams of flux per liter.
Temperature 75 - 77 deg. F.

tance. Neglect of these fundamentals results in much refinishing of work due to unsuitable coatings, increases cost due to formation of dross and burning out of kettles, and decreases production. Undoubtedly the major reason for increased cost of the operation can be attributed to the failure to recognize the importance of these steps.

The preferred treatment cycle is to first of all clean the work in an alkaline cleaner to remove heavy oils or grease which, if permitted to remain on the work, would result in spotty pickling. Following the cleaning operation the work is rinsed thoroughly and transferred to a hot sulfuric acid pickle. The acid concentration is in the order of 7 to 10 per cent by volume. This bath is operated at 160 deg. F. The effect of temperature in the acid pickle is very important. A 3 per cent solution of sulfuric acid pickles twelve times as fast at 180 deg. F. as an 8 per cent solution at 80 deg. F. The time in the acid pickle should be only long enough to permit complete removal of all the oxides that, if permitted to remain on the work, would interfere with proper alloying of the zinc and steel in the kettle, and as a result, either a longer immersion time would be required in the zinc to burn off the oxide resulting in an increase in the dross formation, or, if the shorter immersion time were used, the operator would undoubtedly be confronted with spotty coatings such as bare areas. Over-pickling is not desirable. This results in an increase in surface area which is more readily attacked by the molten zinc during the formation of the alloy. Following the acid pickle the work is thoroughly rinsed; thoroughness of this operation cannot be over-emphasized. It is necessary to quickly transfer the work from the acid pickle into a warm running water rinse, and the work should be rinsed until all traces of iron salts carried over from the acid pickle are removed. Considerable quantities of iron in the form of iron salts will be converted to dross if even a slight concentration of acid remains on the work. Two rinses are preferred. The pH of the rinse tanks can be checked and a comparison made with the pH of the raw water used in the operation. A much lower pH value in the second rinse will indicate inadequate rinsing, which undoubtedly could be attributed to an insufficient supply of fresh water constantly entering the rinse tank. Following the rinsing operation the work is then immersed in a zinc ammonium chloride type of flux. The No. 20 Galvanizing Flux is preferred for this operation. Number 20 Flux is basically a zinc ammonium chloride type of flux of the formula

$$ZNCl_2 3NH_4Cl$$

plus an addition agent which reduces surface tension, resulting in more complete wetting of the surface of the work in the flux wash, as shown in Table I, and also aids in maintaining an active fusion of the flux on the kettle. The

**TABLE II-A**

STABILITY WHEN HEATED

| Iron Present at Start, gm./liter | | Iron After 24 Hours at 150/160 deg. F., gm./liter | | Change in Iron Content, gm./liter | | pH of Filtrate |
|---|---|---|---|---|---|---|
| Fe++ | Fe, Total | Fe++ | Fe, Total | Fe++ | Fe, Total | |
| 6.87 | 7.01 | 6.66 | 6.84 | —.21 | —.17 | 2.60 |
| 2.42 | 2.60 | 2.32 | 2.62 | —.10 | +.02 | 3.25 |
| .85 | 1.00 | 0.952 | 1.07 | +.10 | +.07 | 3.68 |
| .53 | .67 | 0.595 | 0.714 | +.06 | +.04 | 3.70 |

Fe here determined in filtered samples. The stock 15 deg. Baume flux wash reads 3.70 pH.

purpose of this flux wash is not to accomplish any further pickling or the removal of oxides not removed in the preceding sulfuric acid pickle, but rather, its sole function is to completely cover the surface of the work being processed with a more neutral flux film, which will prevent further oxidation of the surface before immersing the work in the molten zinc. Its further advantages is in the supply of fresh flux which is quickly washed away as the work is immersed in the zinc, to leave a clean, active surface to quickly alloy with the molten zinc. If the preceding water rinses did not remove all the iron salts these salts would be removed in the flux wash; however, these same salts would then be carried over with the flux film into the kettle to form dross. An indication of this can be noted in the pH value of the flux wash. In some cases, through rinse control it has been proved that the iron to form dross which is carried in as a part of the flux wash itself is in the order of 5 per cent of the total iron present in the dross. When the iron content of the flux wash approaches 0.3 oz./gal. (2.25 gm./l.) steps are taken to remove it from the flux solution. Zinc ammonium chloride type of flux wash also acts as an electrolyte and on some parts which come in contact with each other in the flux wash, galvanic action is set up with the resulting dissolution of iron from the work. It is possible to precipitate the iron in the flux wash, which eliminates the necessity of discarding the flux

**TABLE II-B**

RELATION OF pH TO PURIFICATION

| pH at Start | Iron at Start gm./liter | | Per cent $H_2O_2$ By Volume Added | Iron After Adding $H_2O_2$ and Filtering gm./liter | |
|---|---|---|---|---|---|
| | Fe++ | Fe, Total | | Fe++ | Fe, Total |
| 2.56 | 7.40 | 7.45 | 2 | 1.09 | 7.07 |
| 4.36 | 7.40 | 7.45 | 2 | 0.29 | 7.07 |
| 5.44 | 7.40 | 7.45 | 2 | 0.18 | 2.37 |
| 5.79 | 7.40 | 7.45 | 2 | 0.14 | 0.59 |

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**TABLE II-C**

EFFECT OF IRON—ZINC AMMONIUM CHLORIDE—IRON CELL

| Solution Allowed to Stand with no additions (Concentration in gm./liter) | | | | Solutions with the $Fe/ZNCl_2 3NH_4Cl/Fe$ Cell (Concentration in gm./liter) | | | |
|---|---|---|---|---|---|---|---|
| Elapsed Hours | pH | Fe++ | Total Fe | Elapsed Hours | pH | Fe++ | Total Fe |
| 0 | 4.08 | 2.03 | 2.03 | 0 | 4.06 | 2.03 | 2.03 |
| 96 | 3.76 | 2.12 | 2.12 | 96 | 3.93 | 2.30 | 2.33 |
| 192 | 3.61 | 2.12 | 2.15 | 192 | 4.01 | 2.48 | 2.51 |
| 528 | 3.29 | 2.15 | 2.12 | 528 | 4.21 | 2.84 | 2.88 |

wash at frequent intervals. Baldwin[2] presented data on the stability of zinc ammonium chloride flux washes and iron removal, as shown in Table II-A. The conclusions drawn were:

1. Better than 90 per cent of the iron dissolved in zinc ammonium chloride solutions is present in the ferric state.
2. This dissolved iron is stable in pH values of 5.8.
3. For efficient precipitation of the dissolved iron the pH value should be brought up to 5.4 or higher, and then the iron should be oxidized to the ferric state.
4. If the solution containing the oxidized iron is warmed and agitated for about one-half hour or better, the iron precipitate is dense and heavy enough to be easily decanted, filtered, or removed by centrifuge.

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The pH can be raised by the addition of ammonia, and a suitable oxidizing agent is 30 per cent (100 volume) hydrogen peroxide. Following the operation for the removal of iron, additional flux can be added to the flux wash to adjust to the proper concentration.

The No. 20 Flux, which is so effective as a flux wash, is also used as a blanket flux for the kettle. The temperature at which this material volatilizes is somewhat higher than the sal-ammoniac, resulting in a more active fusion, improved pre-heating of the work being processed, and a reduction in the loss from skimming. Following the modern procedure outlined results in smoother coatings of a more pleasing appearance and more ductile coatings due to the reduction in thickness of the zinc-iron alloy. This combination of improved quality and reduced waste is a combination to be desired by all hot dip galvanizers.

LITERATURE CITED

[1] Mario Tama, "New Galvanizing Furnace Forms No Dross," Iron Age, April 13, 1950, pp. 93-96.
[2] A. T. Baldwin, "Progress of Fluxing in Hot Galvanizing Practice," Steel, May 13, 1948.

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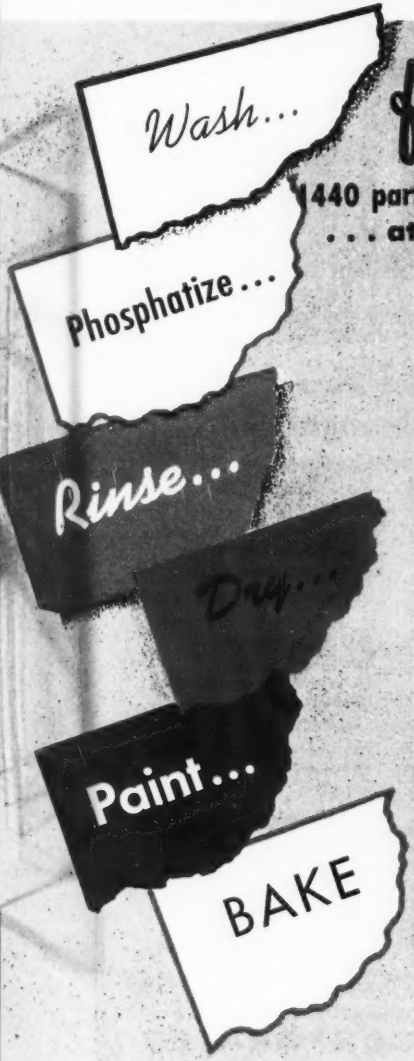


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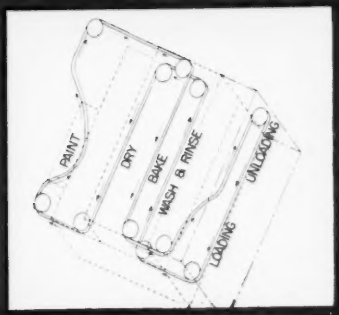
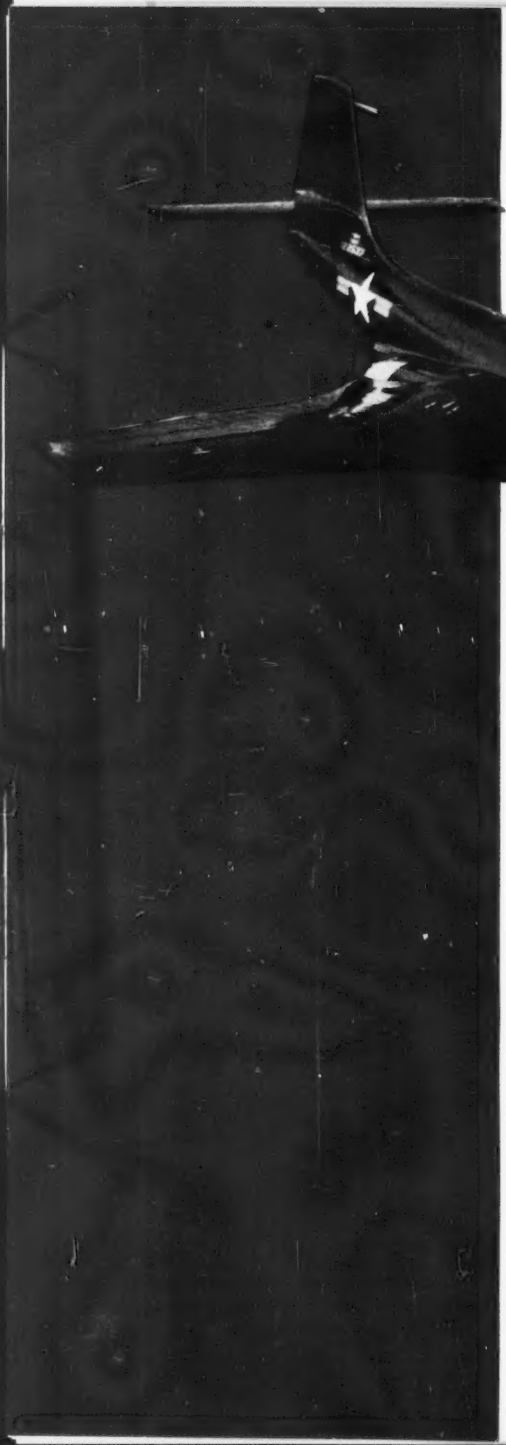
*Schematic of finishing system: All operations except "Bake" are at floor level of machine. Entire machine is just 10 feet high.*





AS aircraft designers inch ever closer to the fringe of sonic flight, a host of problems arise to bar entry into that speed zone referred to in almost reverent tones by engineers as "Mach One." Just one example of the many problems facing designers is the application of a proper aircraft finish to stand up under the rigors of flight flexure, vibration and extreme temperature changes. Chemists and aerodynamicists have teamed up to lick the problem so that now, after exhaustive experimentation, the solution seems assured.

An excellent example of such collaboration is the job being done through the joint efforts of the McDonnell Aircraft Corporation and the Sherwin-Williams Company. McDonnell, manufacturer of the first all-jet Navy fighter, the Phantom, and its king-sized brother, the Banshee, is currently delivering its Navy-blue planes to Navy and Marine operational squadrons.

In addition to mere improvement of appearance and prevention from cor-

# Finishes Meet The Sonic Challenge

rosion, jet airplane manufacturers have another important task — that of achieving the extremely smooth exterior finish which is essential if maximum aerodynamic efficiency is to be realized. This is accomplished by careful application of high quality fairing compounds, surfacers, lacquers, and enamels.

A high rate of climb is an important feature of modern airplane design, but with this rapid change in altitude come severe temperature changes. Variations of 100 deg. F. per minute are not uncommon. The high coefficient of thermal expansion of aluminum alloys necessitates the use of protective coatings which retain their flexibility over a long period of time.

Fairing compounds used for filling excessively wide butt joints and for smoothing over minor surface defects must also be very flexible because, in addition to the rapid temperature changes, a great deal of flexure in the aircraft structure is concentrated at the butt joint. This flexing may be caused by engine vibration, firing of guns or loading variations caused by the flight conditions of the airplane.

Finishing materials must be extremely tough and durable in order to withstand the impact of air, rain and hail at high speeds. This impact can be

Fig. 1—A group of completed "Banshees" ready for delivery.

Fig. 2—A coating of S-W sea blue cellulose nitrate aircraft lacquer is applied over a "Phantom" tail surface by a paint sprayer.

great enough to erode the finish from the nose of the fuselage and the leading edge of the wing, stabilizer, and fin. The drag caused by this roughened area may reduce the top speed of an airplane by as much as 75 miles per hour.

The adhesion of the finishing materials to the metal beneath them must be almost perfect if the finish is to stand up for any length of time. Sections which do not have a tight paint coat will be sources of early failure. In addition, the finish must be hard, glossy, and extremely smooth.

The requirements laid down for surfacing materials on jet aircraft are exhausting to the nth degree. The primer must have excellent adhesion to aluminum, must remain flexible through a temperature range of minus 70 to plus 200 deg. F., must be rapid drying, and must provide a good paint base.

The fairing putty must have a high degree of flexibility and adhesion to metal. Secondary requirements are that the compound must be easily applied and sanded and that shrinkage be kept to a minimum.

Surfacers must be flexible and must possess good adhesion to the primer and the applicable topcoat materials. Most surfacers tend to become brittle due to the high ratio of pigment to vehicle which is used to provide good sanding properties. It is believed that a more flexible surfacer which is a little more difficult to sand would be acceptable to most aircraft manufacturers.

The topcoat material must be hard, tough, flexible, and smooth. An air-drying material proves most satisfactory because of the difficulties attendant to the baking of finishes on entire airplanes.

It goes without saying that proper cleaning and treating is the basis of success of any finishing system. Anodizing furnishes an excellent base for paint and, in addition, provides a tough film which is resistant to abrasion. This film protects the aluminum surface to some extent from minor scratches which often occur during fabrication.

### Finishing

The finishing of a high-speed airplane such as the Phantom or Banshee is a costly and time-consuming job. The first paint shop operation is the examination of the shop primer coat which is applied to all sheet metal parts immediately after fabrication. Unsatisfactory portions are stripped away before cleaning the remainder. A touch-up primer coat is then applied to all bare areas.

Four coats of sanding surfacer are

then applied to the forward forty per cent of the wings. Where necessary, S-W aluminum putty is applied to cover minor surface defects. The surfaced and puttied areas are then water sanded—first with heavy and then with lighter sandpaper.

One heavy cross coat of glossy sea-blue lacquer is then applied and wet sanded with a very light sandpaper. A second coat of lacquer is applied to the entire plane, after which the finish is thoroughly polished and waxed in order to obtain the smoothest surface possible.

Both the Navy and McDonnell management believe that the labor and expense of producing this satin-smooth finish is well justified by the performance gain. Speed increases in excess of 20 m.p.h. have been attributed directly to the reduction in drag accomplished by the application of this special finish.

As McDonnell and other "jet" manufacturers inch closer to the fringe of sonic flight, such aerodynamic conditions as vibration, flutter, and surface friction will increase finishing problems enormously.

### Testing

At McDonnell Aircraft a number of materials have been tested in an effort to set up a satisfactory finishing procedure. The tests covered such phases as flexibility, vibration, and impact resistance.

The flexibility test was applied to fairing compounds by applying the material to a strip of light gauge annealed aluminum and bending the strip through 180 degrees over bars of progressively smaller diameter, starting with three-fourths of an inch. It was found best to apply the putty thickly, about 0.04 inch being a typical figure, and the samples were allowed to stand at room temperature for about three weeks in order that the material could cure out completely.

Surfacers and topcoat materials were checked in the same manner by applying two cross coats to the samples and bending through 180 degrees over bars of progressively smaller diameter starting with one-fourth inch. These samples were also allowed to stand at room temperatures for about three

Fig. 3—Thorough polishing and waxing are the final processes in making the finish smooth and glossy. Here, a McDonnell employee buffs the tail stabilizer.
*(Photos courtesy McDonnell Aircraft Corp., St. Louis, Mo.)*

weeks before any testing was done.

In order to get the most severe condition of vibration testing, the test was conducted in a cold box at a temperature of minus 65 deg. F. Samples were prepared in such a way as to simulate a butt joint and the gap was purposely made 0.09 inch wide. This gap was then filled with fairing putty and sanded smooth. The samples were mounted vertically in the cold box and fixed at the base.

The top end was bolted to an arm which was connected eccentrically with a motor located outside the cold box. The motor turned at 1800 r.p.m. and the sample was flexed 0.10 inch at the center by the eccentrically-mounted arm. Samples were tested as long as necessary in order to rate the various materials under consideration.

Two methods of testing impact resistance were employed in an effort to develop suitable finishing procedures which would produce a hard, tough finish. Tests were expected to simulate the effect of an airplane flying into a rain or hail storm at velocities up to 700 m.p.h. The samples used were contoured to represent a typical leading edge section of the wing and the finish was applied exactly as it would be applied to the airplane.

The first method employed was fairly simple and inexpensive. A water and air mixture was shot against the nose of the sample at a velocity of approximately 400 m.p.h. It was interesting to note that the basic finishing system for military aircraft—one coat of zinc chromate primer and two coats of cellulose nitrate lacquer—started to disintegrate in less than one minute under this test.

As the first method was found impractical for speeds in excess of 400 m.p.h. a second method was devised. In this system the sample was whirled through the air by a motor through streams of water located along its path. Velocities up to 700 m.p.h. were attained but the method of testing was thought to be very dangerous unless care was exercised in the design of the whirling arm.

Although actual tests were conducted at McDonnell, results were carefully coordinated with Sherwin-Williams representatives who reported findings to the company's laboratories in Chicago where similar tests were also being conducted. Such teamwork between manufacturer and vendor is just one example of the highly integrated coordination necessary in this day of jet research and development.

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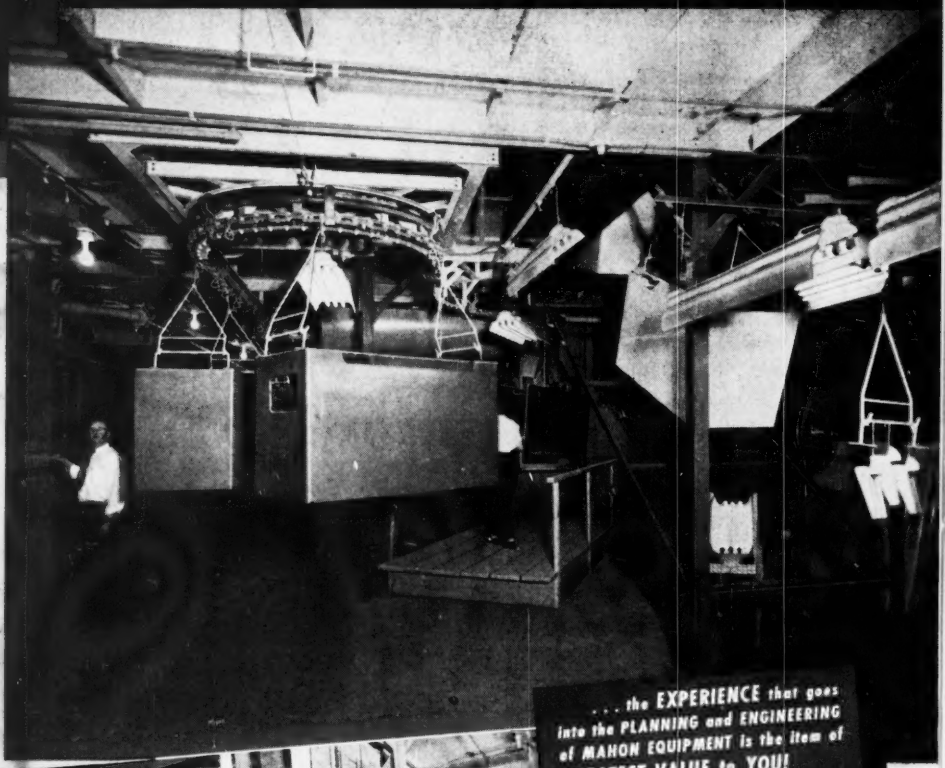

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Finishing

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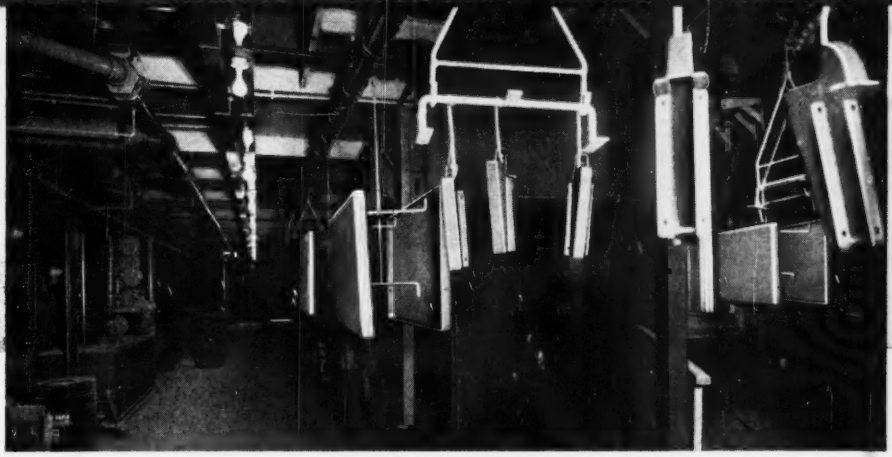

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**OCTOBER 31—NOVEMBER 3**

### WEDNESDAY, OCTOBER 31

1:00 P. M. Registration
2:00 P. M. Council Meeting
Paint Industries' Show Opens
6:00 P. M. Registration Closes
Council Dinner
Paint Industries' Show Closes

### THURSDAY, NOVEMBER 1

8:30 A.M. Registration
9:30 A.M. Paint Industries' Show Opens
10:30 A.M. Meetings Open
Greetings From R. D. BONNEY, *President*
Welcome From G. H. WESCOTT, *Meetings Committee Chairman*
"Properties of Orange Pigments"—H. GOUGH, *Philadelphia Club*
Report on the Paint Industries' Show
"Measurement of Dry Hiding Power of Paints"—E. S. DUNN, *New York Club*
Annual Business Meeting, Election of Officers

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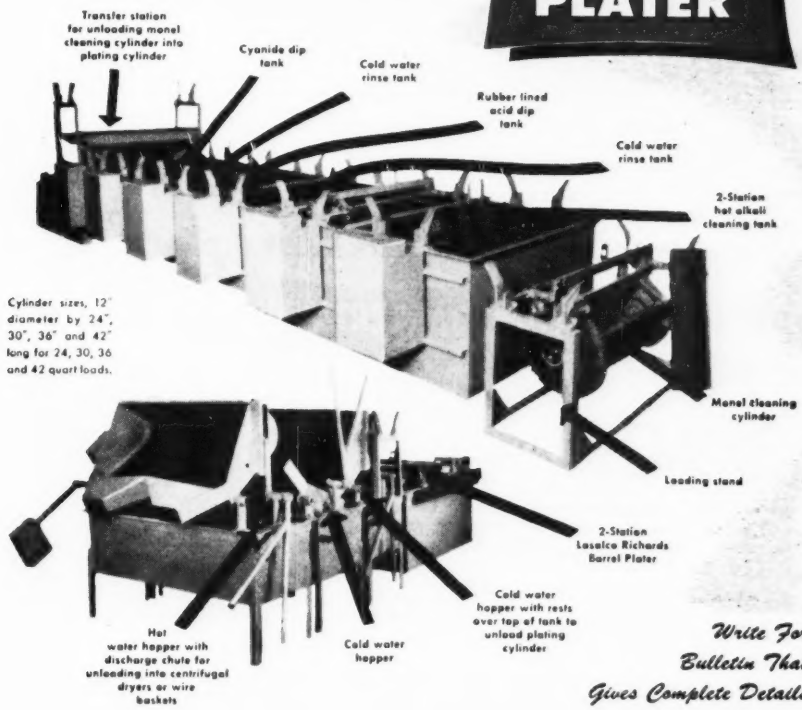
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2:00 P. M. Report on the Activities of the Scientific Section of the National Paint, Varnish and Lacquer Association—J. C. MOORE, *Director*

Annual Report of the President—R. D. BONNEY

Address by J. F. BATTLEY, *President of the National Paint, Varnish and Lacquer Association*

Report of the Materials Committee—W. P. COLIO, *Chairman*

"Preliminary Study of the Morehouse Mill"—W. FOY, *CDIC Club*

"Survey of Straining Methods Used in the Paint Industry"—H. ELLSWORTH, *New England Club*

"Filtering and Standards and Tests for Cleanliness"—A. BARKMAN, *Chicago Club*

Report of the Standards and Methods of Test Committee—F. M. DAMITZ, *Chairman*

"Flooding and Floating of Pigments"—E. G. SHUR, *New York Club*

6:00 P. M. Paint Industries' Show Closes

6:30 P. M. Annual Dinner of Twenty-Two Year Club

8:00 P. M. Registration Closes

8:30 P. M. Annual Bridge Tournament


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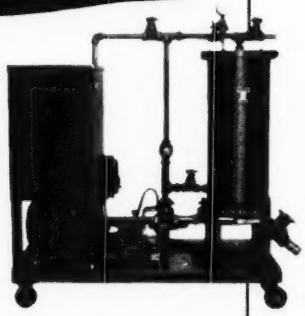

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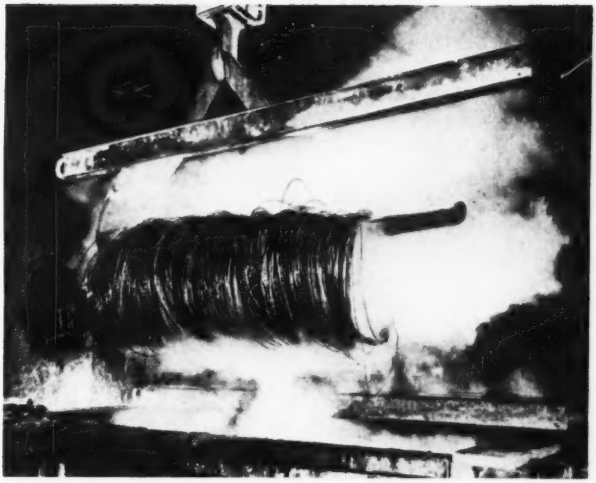

Monel pickling hook used at the Pittsburgh Steel Co., Pittsburgh, Pa. Fabricated by Youngstown Welding and Engineering Co., Youngstown, Ohio.

# Reconditioned after 7 years in use!

## Monel pickling hooks after "minor surgery" and welding are ready for more years of service

Back in 1944, Pittsburgh Steel Co. installed Monel hairpin pickling hooks.

Monel® was selected after many tests with other materials that failed in less than a year.

Operating conditions were tough, pickling in 10% sulfuric acid at 180°, carrying a load of 3,000 pounds.

But Pittsburgh Steel felt that Monel could take it.

And they were right!

After *seven* years in use, the hooks showed signs of weakening only at the acid line.

And the fabricators, Youngstown Welding & Engineering Co., remedied that!

They cut out the corroded section and welded in new Monel.

Now, Youngstown feels that the hooks are almost as good as new and will give many more years of service.

This is a typical example of how fabricated Monel pickling equipment can give long service life — then be reconditioned with a small amount of material to give additionally long service.

Tough, corrosion-resistant Monel equipment can help you increase the efficiency of your own pickling room, too. Monel crates, racks, chains, hooks, and accessories are used by many of the nation's leading plants to give increased payloads and longer service life.

Right now, Monel is hard to get because so much is being diverted to defense production. But if you have a special metal failure problem, Inco's Technical Service Section will be glad to help you solve it. Write, giving full details.

**THE INTERNATIONAL NICKEL COMPANY, INC.**
67 Wall Street, New York 5, N. Y.

INCO **MONEL**... for minimum maintenance

## FRIDAY, NOVEMBER 2

8:30 A.M. Registration

9:30 A.M. Paint Industries' Show Opens

10:00 A.M. "A Study of Primers for Ferrous Metals on Atmospheric Exposure: VI"—T. DEMBSKI, *New England Club*

"Study of Pigment Volume in Exterior House Paints"—D. E. WILEY, *Montreal Club*

Report of Liaison Council—R. W. MATLACK, *Chairman*

Guest Speaker, H. BRAYMAN, *E. I. du Pont de Nemours & Company*

Report of Joint Federation—Association Technical Education Committee

2:00 P.M. "Correlation of Flash Point Equipment"—V. L. SAHLI, *Cleveland Club*

The Joseph J. Mattiello Lecture: "Thermal Polymerization of Esters of Unsaturated Fatty Acids"—DR. D. H. WHEELER, *Research Laboratories, General Mills, Inc.*

Report on the Federation Research Program

Report of Educational Committee—P. O. BLACKMORE, *Chairman*

Report of Research Program Coordinator—W. O. LUNDBERG

"Rate of Erosion and Hardness and Abrasion Resistance of Drying Oil Films"—R. C. ADAMS, *Gilman Paint and Varnish Co.*


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Electroplating, Anodizing
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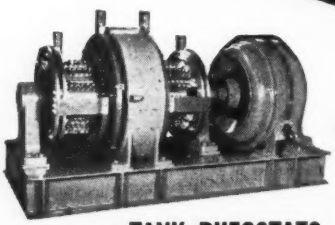

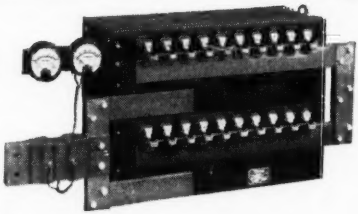

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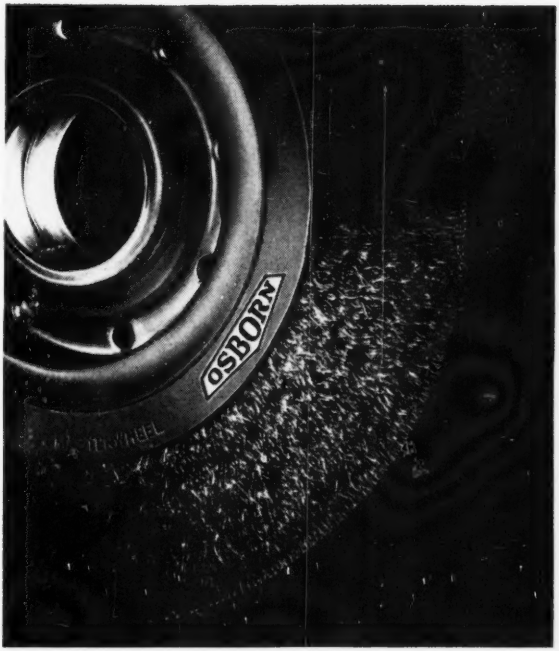


# Multiply your manpower with these new steel muscles

*Thousands* of plants are discovering how to lick manpower problems with new Osborn Brushing techniques. Let's find out how they can help *you!*

Machine-powered Osborn brushes are removing burrs from threads and other parts 3 to 10 times faster than former hand methods. They are doing product cleaning, finishing and many other operations in a matter of seconds. They release skilled manpower for other work and cut rejects to the minimum.

Whether your product is metal, rubber, plastic or fabric, it will pay you to call in the **O**sborn **B**rushing **A**nalyst to study your cleaning, deburring and finishing operations. He will recommend improvements with the latest Osborn power brushing techniques. Call or write *The Osborn Manufacturing Co., Dept. 549, 5401 Hamilton Ave., Cleveland 14, O.*

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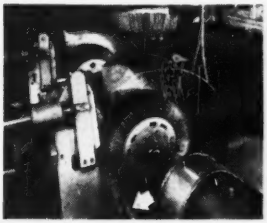
**DEBURRING OUTPUT TRIPLED.** That's the production increase in this plant using Osborn Power Brushing for the removal of burrs from clutch discs. And quality of finish is greatly improved.



**FINISHING OUTPUT UP 20%.** Osborn Power Brushing removes heat-treat discolorations and surface imperfections of these shafts prior to plating. Cut number of passes from two to one, increasing output 20%.

**THIS IS "OSBORN".** Our engineers . . . in the field and at the factory . . . have a vast fund of experience to help solve your cleaning and finishing problems. When you buy brushes with the name "OSBORN" you can be sure you are getting tools for unsurpassed production *results!*

**See New Osborn Brushes and Methods at National Metal Exposition. Detroit—Oct. 15-19—Booth D 118**

"Chemical Changes in Films With Aging"—DR. R. E. DUNBAR, *Head, School of Chemical Technology, North Dakota Agricultural College*

"Changes in Infra-red Spectra of Films"—R. W. AUXIER, *Manager, Chemical Dept., Westinghouse Research Laboratories*

"Depth to Which Oxygen Penetrates Drying Oil Films"—DR. L. L. CARRICK, *Dept. of Chemical and Metallurgical Engineering, University of Michigan*

"Stress-strain Properties of Clear and Pigmented Pure Ester Films"—DR. A. C. ELM, *Technical Director, Standard Varnish Works and Toch Brothers, Inc.* (This work was carried on under the supervision of Dr. Elm in the Research Dept. of the New Jersey Zinc Company of Pennsylvania).

5:00 P. M. Registration Closes

6:00 P. M. Paint Industries' Show Closes

6:30 P. M. Annual Banquet
Awards and Entertainment

10:00 P. M. Dance

## SATURDAY, NOVEMBER 3

8:30 A. M. Registration

9:30 A. M. Paint Industries' Show Opens

"Styrenation and Esterification of Tall Oil"—DR. W. BOSCH *and* R. R. DRUBEL, *North Dakota Agricultural College*

Report of the Manufacturing Committee—N. T. PHELPS, *Chairman*

Round Table Discussion: "Straining and Filtering Problems in Production"—*Moderator*: H. KELFER, *New England Club*

Round Table Discussion: "Specification Finishes"—*Moderator*: J. K. STRAITH, *Detroit Club*

1:00 P. M. Announcements—Meeting Closes

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***5200 UNITS PASS THROUGH THE OVEN.** Daily

The new NesTier twin hopper tote box at The CHAS. Wm. DOEPKE MFG. COMPANY was taxing production facilities, but the new Young & Bertke FINISHING SYSTEM shown in the photograph, met THIS CHALLENGE by grouping units, without fear of drying hazards . . . saving fuel by 20% and stepping up production 13% . . . A BIG RETURN FOR EVERY MINUTE OF TIME. No matter the size or type of plant there is a Young & Bertke Oven to do a better finishing job at LOWER COST.

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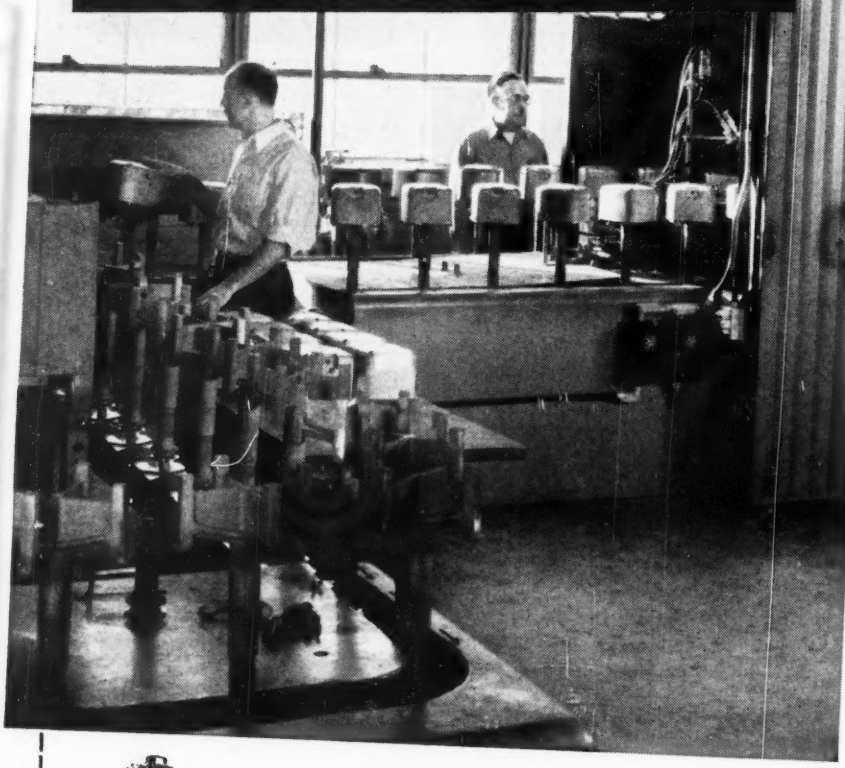

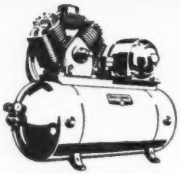

*Air Compressors*

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# COULD YOU PROFIT WITH A DE VILBISS AUTOMATIC?

It's well worth investigating. Special DeVilbiss automatic machines for mass production finishing have proved profitable for many businesses.

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Automatic Spray Guns cover every surface of each vacuum cleaner part with a smooth, even, two-coat hammered metal finish. The finish is baked on as it leaves the booth.

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Improved finishing technique like this is typical of DeVilbiss service and products – Spray Equipment, Air Compressors, Exhaust Systems, Hose and Connections.

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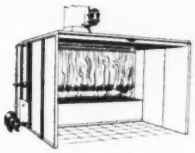

*Spray Booths*

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# Hard Chrome Plating in Spain

By F. R. MORRAL

Associate Professor
Dept. of Materials Engr.
Syracuse University, Syracuse, New York

THE need for hard chromium plating to reduce wear on machine parts and to build up to size worn parts difficult to replace has become increasingly great. Recently, the author had an opportunity to inspect a typical Spanish chromium plating plant and determine the type of work finding the widest application.

The plant inspected was Durachrom in Barcelona. This firm is affiliated with Recubrimientos Electroliticos, S.A., of Madrid. It was established in 1945 and uses the methods of F. B. H. Durachrome, Ltd., of Birmingham, England. The chromium coatings applied on new parts vary from 0.0002 to 0.002 inch; for rebuilding worn parts to size, coatings as thick as 0.04 inch are deposited. Heavier coatings have been produced with improved efficiency and greater uniformity through the use of periodic reversal of current. The company is engaged in development work on the chromium plating of aluminum and also the deposition of heavy nickel coatings to be used in plating worn parts back to size.

Examples of parts which are being chromium plated, one of which is shown in the accompanying illustration, are connecting rods, crank shafts, bolts, valve shafts, and other parts for the automotive, aircraft, and marine industries. Piston rings are not generally plated in Spain, but some porous chromium plating has been done.

As an aid to the important textile industry in this region and also in the region of Valencia, parts subjected to the severe wear of cotton, wool, and other fibers have been chromium plated to secure longer life for the parts in question. For example, the rollers used in textile machinery and operated in a humid environment have been case carburized to reduce wear and, in addition, chromium plated not only for

A connecting rod which has been plated to a thickness of 0.02 inch with chromium.

HOT Lacquer NEWS

PUBLISHED PERIODICALLY BY HERCULES POWDER COMPANY IN THE INTERESTS OF BETTER FINISHES AND FINISHING

# Hot-Spray At Oshkosh Motor Truck Improves Gloss, Speeds Production

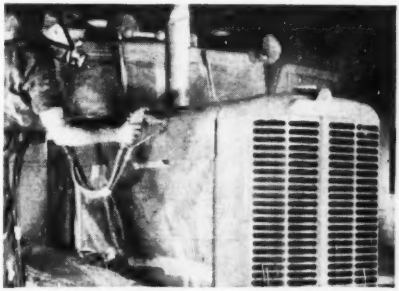
## *Heavy-Duty Trucks Get Heavy-Duty, Low-Cost Finish*

Oshkosh 4-Wheel and 6-Wheel drive trucks are designed specially to perform in fields which are too severe for the conventional rear drive trucks. Manufacturing specifications call for a finish that is equally durable—and actual service has proved that hot-spray lacquer does the job.

According to Mr. A. E. Stoll, Production Manager, "Hot-spray lacquer has improved our finish by better gloss, has cut the over spray by use of 60% less thinners and eliminated periods of blushing.

"The elimination of blushing by use of hot-spray solved our problem of slow-up in finish painting during periods of high humidity, which in our climate is quite frequent in summer and fall.

*Typical fleet of Oshkosh trucks, in service for City of Yonkers, N. Y.*



*Durable hot-lacquer finish being applied to heavy-duty Oshkosh truck.*

"We are satisfied that hot-spray lacquer has improved our finish and increased our painting production."

### NEW MILITARY LACQUER SPEC.

A new military specification for lacquer is now issued and official. Identified as "Military Specification MIL-L-11195 (ORD) Lacquer, Lustreless, Hot Spray (For Ammunition)" Hercules will send you full information on hot lacquer, types of heating equipment available, and the performance record of hot lacquer in many industries.

*HERCULES POWDER COMPANY*
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improved wear resistance but also for resistance to the corrosive conditions in which the parts must operate. Experience has shown that hardened steel is subject to considerable wear in contact with textile fibers. Chromium plating has increased the life of some textile machinery parts as much as four times.

Rolls for flattening electric resistance wire and soft metal wire have been chromium plated with satisfactory results. Compressor shafts for refrigerators are also being chromium plated. Gages of various kinds can be used five times as long after chromium plating as would be possible without the coating of the protective metal. Molds for plastics, rubber, glass, and other materials are being chromium plated to a thickness of about 0.001 inch. Chromium plated punches and dies for fabricating brass are not subject to sticking, have three times the life of the unplated die, and produce a better finish and closer tolerances on the part being manufactured.

The Durachrom plant has a current capacity of 3500 amperes and is in the process of expansion so that additional power and plating facilities will shortly be available. The Spanish industrialist, in addition to production and management problems familiar to American businessmen, is continually faced with restrictions on his power supply, and there may be as many as two days a week on which he does not receive electric current to operate his plant. It is easy to understand the annoyance of such a situation to any one in the electroplating business, and this is one problem not faced by American electroplaters.

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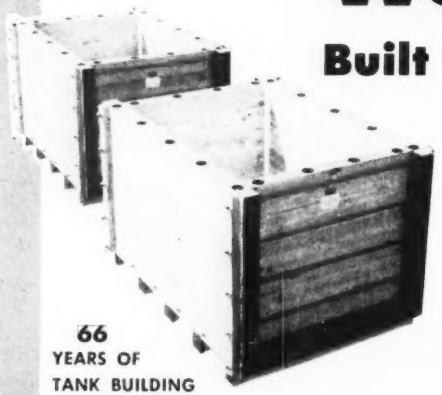
Of the precious metals, platinum is most important to defense because of its uses as a catalyst in contact points and other applications.


# WOOD TANKS

## Built to Specifications



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Plating and pickling tanks built to your specifications is a Kalamazoo specialty — any size or shape — fir, oak, cypress or redwood.

Tanks on left were made for large manufacturer of automobiles. They are 88" x 64" x 62" — made of 8" long-leaf yellow pine with B & M anti-acid metal tie rods.

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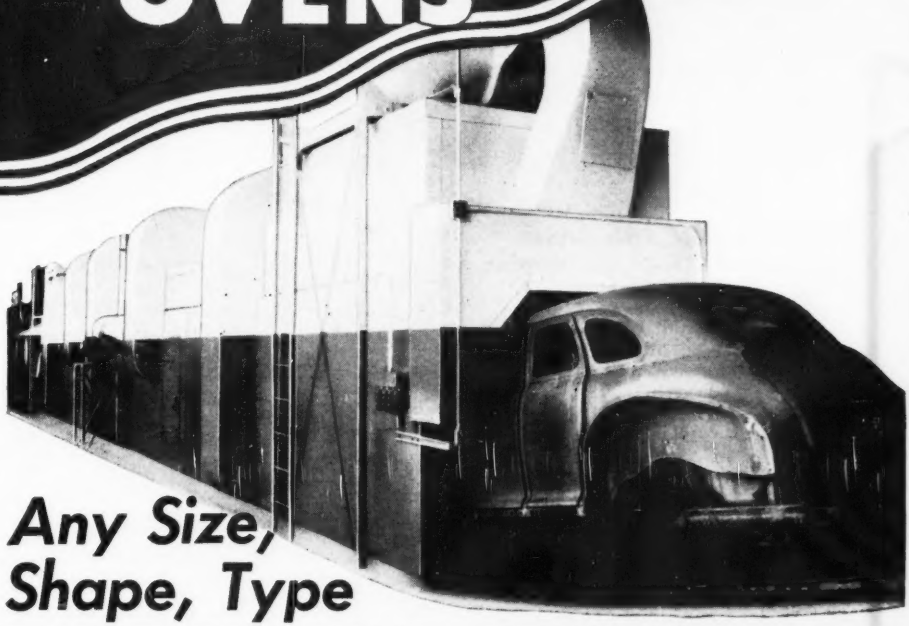
# Schmieg OVENS



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Schmieg ovens give you automatic temperature control, insure against hot spots, are meticulously insulated to prevent heat loss. Every operating essential has been carefully designed and engineered to enable you to safeguard product quality.

So we say—No matter what size, shape or type of oven you may need, for any kind of work, Schmieg ovens give you most for your money.

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Here's a rich, lustrous answer, in a single package, to a wide range of finishing problems! Dimenso One-Coat provides a dual-purpose, finish that goes on in a *single* coat without need for special spray equipment.

It gives beautiful, varied, hammered effects for large, uninteresting surfaces—or, by modifying the method of application, a variety of rich opalescent effects. It can cut metal-finishing costs in many cases by eliminating priming operations . . . covers minor metal surface defects in one coat without expensive surface preparations.

Dimenso One-Coat air-dries out of dust in ten minutes. It *bakes* in 3 to 5 minutes at 350° F. It provides a *tough, mar-resisting* film that withstands severe service, with excellent *heat resistance*. For complete details, ask your Sherwin-Williams Branch for Bulletin D-506 . . . or write to The Sherwin-Williams Co., Industrial Division, Cleveland 1, Ohio.

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Sprayed on smooth metal, Dimenso One-Coat gives a unique hammer pattern. When surfaces are not completely smooth, apply a full wet coat, followed by a light mist coat, and you get a rich, opalescent effect.

**NEEDS NO SPECIAL EQUIPMENT**—Dimenso One-Coat is applied with regular spray equipment and no special skill is needed.

**HIDES SURFACE DEFECTS WITH ONE COAT**—Slight imperfections in metal surfaces are completely hidden by a single coat of this new S-W Brown Label Finish.

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This broad background provides the same extra advantage of experience in Sherwin-Williams finishes supplied to meet military specifications—whether for wood, metal or other surfaces—as in the S-W finishes well known for many years for civilian production, such as Kemclad, Superclad, Kemvar and TV Lacquers. This experience is available wherever you may be, through facilities extending from coast to coast. Call, wire or write The Sherwin-Williams Co., 101 Prospect Ave., N. W., Cleveland 1, Ohio.

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# NBS Micro Hot-Hardness Tester

**National Bureau of Standards Technical Report No. 1569.**

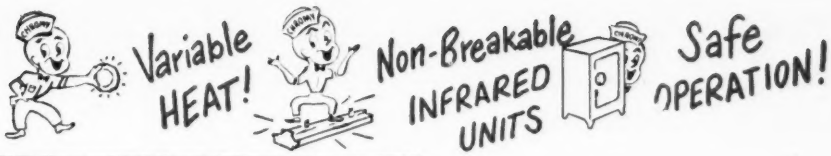
A microhardness tester for measuring the hardness of electrodeposits at elevated temperatures has been developed by Dr. Abner Brenner of the National Bureau of Standards. The new apparatus[1] is based on the diamond-indentation method now used to measure the high-temperature hardness of bulk metals. However, because of the relative thinness of electroplated coatings and their softness at high temperatures, the device has been especially designed to make indentations of microscopic depth under very low loads. Other advantages over previous instruments should also make the tester of value for determining the hot-hardness of bulk metals; in particular, it is expected to find important application in studies of the properties of new types of high-temperature alloys.

The hot-hardness of a metal or alloy is often an important indication of the performance to be expected at high temperatures. Moreover, because a relation usually exists between the hardness of a metal and some of its other mechanical properties, such as tensile strength, data on hardness at various temperatures may also be useful in estimating those mechanical properties that are more difficult to measure.

Although a number of different devices using indenters of various types have been developed for measuring the hot-hardness of bulk metals, none of these instruments has been found suitable for electrodeposits. In general, the indentation methods produce surface impressions, usually in the form of a four-sided pyramid, whose measurable dimensions vary with depth of marking and thus indicate the degree of hardness. The instruments used with bulk metals either employ indenters unsuitable for thin metal coatings or else use heavy loads to produce deep indentations which would pierce the coatings. For testing electrodeposits, other instruments known as microhardness testers have been developed to produce very shallow indentations under low load, but until now such devices have not been applicable to high-temperature work. NBS therefore undertook to develop a practical method of testing the hot-hardness of electrodeposits. The resulting apparatus overcomes the disadvantages of previous instruments and provides data on electrodeposits at temperatures up to 900 degrees Centigrade.

In adapting microhardness testing to high temperatures, it was necessary to use a closed system with an inert atmosphere in order to prevent oxidation of the specimen. Otherwise, the diamond indenter would have to indent a

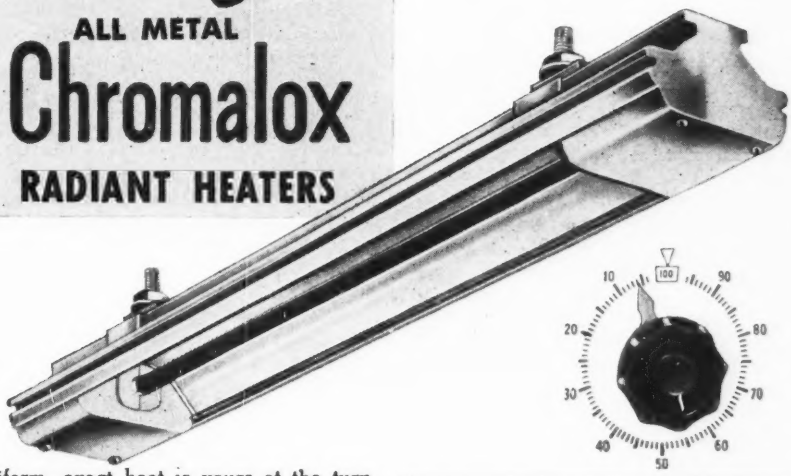
Fig. 1—The new microhardness tester developed by the National Bureau of Standards now makes it possible to measure the hardness of electrodeposited coatings at elevated temperatures.




YOU GET ALL 3 with
ALL METAL

# Chromalox

RADIANT HEATERS




Uniform, exact heat is yours at the turn of the dial with Chromalox Electric Radiant Heaters. Quickly installed, Chromalox Units operate efficiently in low and high ambient temperatures; provide glareless radiation in infrared wave lengths absorbed efficiently by all colors, textures and surfaces. All-metal construction withstands shock, vibration, dust, moisture and eliminates contamination hazard.

Finger-tip control assures consistent and exact operating temperatures for varying needs. Various zones of heat within the same oven are possible by setting up separate controls for each bank of units.

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considerable thickness of oxide film before reaching the electrodeposited coating. Also, oxidation occurring after a microindentation had been made would tend to obliterate the impression. Another problem involved the indenter shaft. In order that a light load may be applied accurately, the shaft carrying the indenter must move in a bearing with very little friction. Yet the clearance between the rod and the bearing must be very small to prevent the entrance of air.

These problems were met by using, in the tester, an inert atmosphere slightly above atmospheric pressure and by making the indenter shaft a capillary of fused silica which moves in a dry bearing lubricated with graphite. Clearance between shaft and bearing is only about 0.001 inch, and the gas escapes slowly through this space during the test.

The NBS apparatus consists essentially of a Vickers diamond indenter mounted on the shaft of fused silica; a mechanical device for raising and lowering the indenter; an electric furnace for heating the specimen; and a micormeter device for orienting the specimen under the indenter. Loading mechanism, indenter, and furnace are all enclosed in one compact, self-contained unit.

Before using the apparatus, it is evacuated and flushed out with hydrogen. An inert gas is then passed in under pressure. Specimens are heated, six at a time, in a muffle made of two tubes, one horizontal and one vertical, which intersect to form a cross. The specimens are moved along the horizontal tube of the muffle until one of them comes to rest on an anvil which occupies the lower part of the vertical tube. The indenter is then lowered through the upper part of the vertical furnace tube to make a pyramidal impression on the specimen resting on the anvil.

The muffle was constructed by welding heavy-walled stainless-steel pipes together and is heated with Nichrome wire wound on an Alundum form. The anvil is a solid piece of stainless steel welded into the vertical pipe; a small

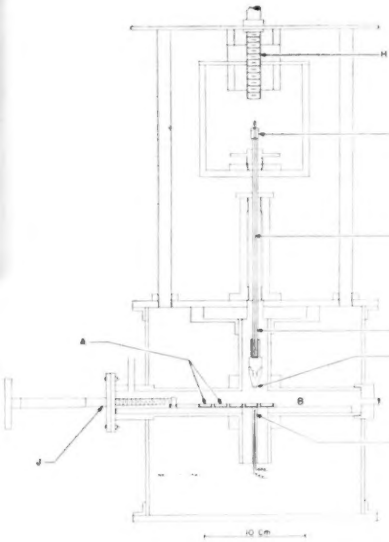


Fig. 2—Schematic cross section of the new microhardness tester developed by the National Bureau of Standards to measure the hardness of plated coatings at elevated temperatures. Specimens (A) are heated in the electric furnace (B), which consists of two tubes jointed in the form of a cross and wound with Nichrome wire. When a specimen comes to rest on the anvil (C), the indenter (D) is lowered to make pyramidal impression on the specimen. The indenter shaft (E) is a capillary of fused silica. The indenter is attached to a tungsten rod (F), which passes up through the capillary and is held by a collar (C) and set screw. The entire indenter assembly is raised and lowered by a screw mechanism (H) operated by a small motor. The micrometer (J) which moves the carriage containing the specimens past the indenter, serves to locate the indentation so that it can be readily measured later with a travelling microscope. Temperature of the furnace is given by the thermocouple within the anvil. In operation, the entire apparatus is filled with an inert gas under slight positive pressure.

*(Illustrations courtesy National Bureau of Standards, Washington 25, D. C.)*

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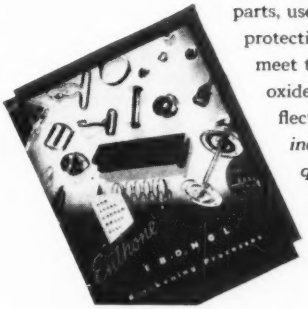


## Enthone inc

442 ELM STREET NEW HAVEN CONN

hole extends to within 0.125 inch of its upper surface to accommodate a thermocouple. The space between the furnace unit and the outer shell of the apparatus is filled with insulation. By making the muffle assembly a single welded unit by supporting it from a single point, relative motion between various parts due to thermal expansion is minimized.

Because the indenter fitting cannot be anchored directly to the fused silica, it is first attached to a tungsten rod, which passes up through the silica capillary and is held by a collar and set screw. A spring at the top of the rod holds it under continuous tension and thus allows for its expansion with increasing temperature.

The indenter and its shaft are raised and lowered at the rate of 2 cm (0.75 inch) per minute by a small motor which operates a simple screw mechanism similar to that used on the compound rest of a lathe. The vibration of the motor is damped by a mounting of rubber shock absorbers.

The indenter assembly weighs about 200 grams. Additional load can be applied to the indenter by placing weights on top of the assembly. Lower loads for use at elevated temperatures are obtained by increasing the gas pressure in the tester above atmospheric.

The six specimens to be indented in one heat fit into a tray or carriage which slides on a keyway on the inside of the muffle tube. The carriage is moved along the tube by a stainless-steel micrometer screw which is plated with cobalt-tungsten alloy to prevent seizing at elevated temperatures. The micrometer serves to locate an indentation within about 0.2 mm (0.008 inch) of a desired spot.

Because the indentations are microscopic in size, they are difficult to locate in the small field of a microscope for measurement of their dimensions. For this reason, a fitting has been designed to hold the carriage in a definite position on the stage of a travelling microscope. By setting the microscope stage at the same reading as that on the micrometer when the indentation was made, the impression is easily brought into the field of view.

In addition to its use in measuring the hot-hardness of electrodeposits, the NBS Microhardness Tester has several advantages which should make it useful in the testing of bulk metals. For example, when measurements are made at high temperatures, the small loads which are applied to the indenter are less likely to cause the diamond to shift in its mounting than are the larger loads usually applied in hot-hardness testers of this type. The micrometer screw, which permits indentations to be made at specified points and enables them subsequently to be located in the microscopic field, should also be advantageous in the testing of bulk metals as well as electrodeposits.

Lack of a suitable apparatus for comparison has made it impracticable to determine the accuracy of the NBS Microhardness Tester at high temperatures. However, when it was compared at room temperature with a standard type of microhardness tester using a variety of different kinds of specimens, the agreement was within 4 per cent on the average.

[1] For more complete details, see Microhardness tester for metals at elevated temperatures, by Abner Brenner, J. Research NBS 46, 126 (1951) RP 2185.


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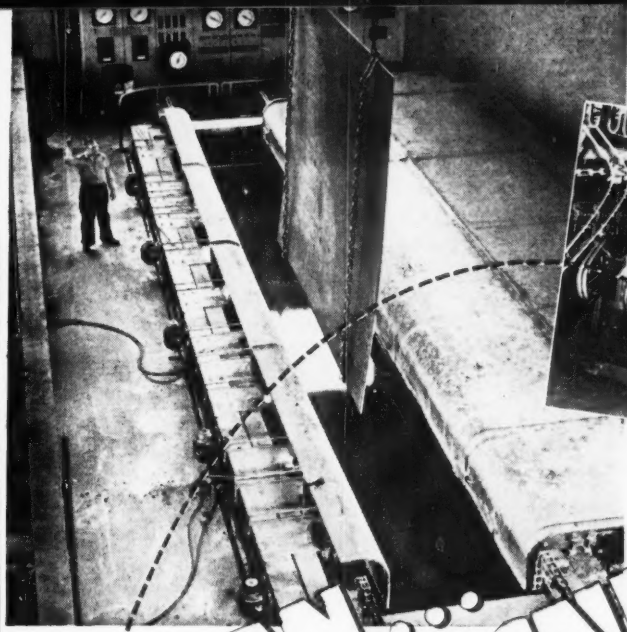

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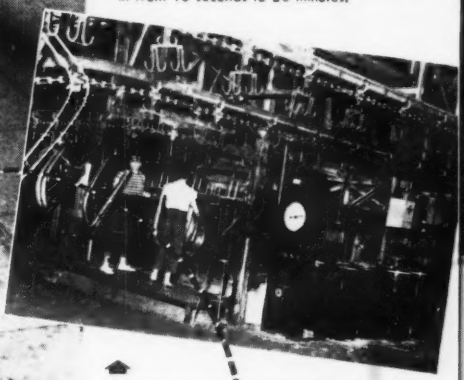

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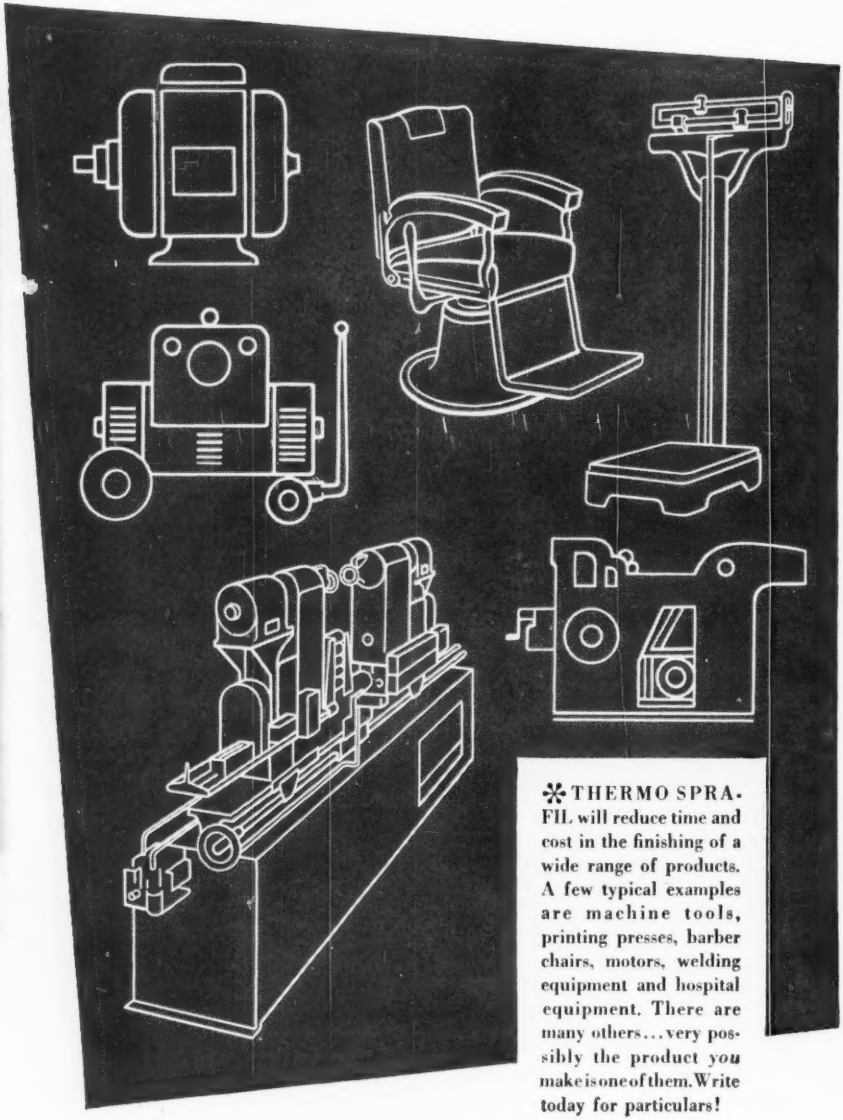

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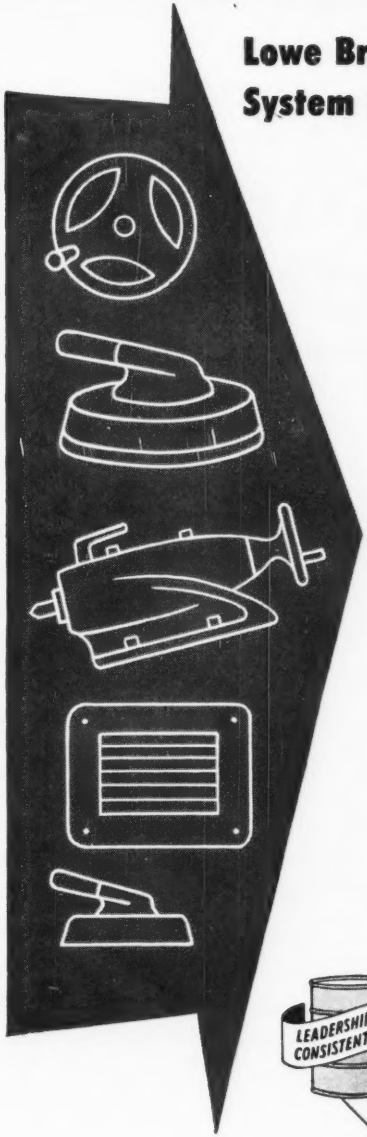

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# Spotlighting FINISHING Progress

## Advances in Mechanical Finishing Open Up New Possibilities

ONE important point to be considered by manufacturers concerned with rising finishing costs is whether they are taking full advantage of the recent strides that have been made in the various methods of mechanical finishing. Two developments have been particularly outstanding: barrel tumbling and abrasive belt polishing. Modern tumbling methods are being used to deburr, burnish, hone, as well as to remove scale and tool marks, and form radii to blueprint specifications. Coated abrasive belts have become established as efficient production tools in polishing many types of metal products. Knowledge of what can be accomplished in plant applications of the various mechanical finishing methods is a valuable asset to the full utilization of their production and cost-saving possibilities.

**Precision Abrasive Tumbling**

The mass production of small parts of all kinds —gray iron castings, die castings, steel forgings, and stampings—has placed new emphasis on the problem of finishing such parts. Inevitable burrs, flash, sharp edges, scale and tool marks must be removed and surfaces made smooth. The Norton Company has reported that a large manufacturer of business machines is processing as many as 8,500 different parts by barrel tumbling with aluminum oxide abrasive, the average weekly output of tumbled parts reach-

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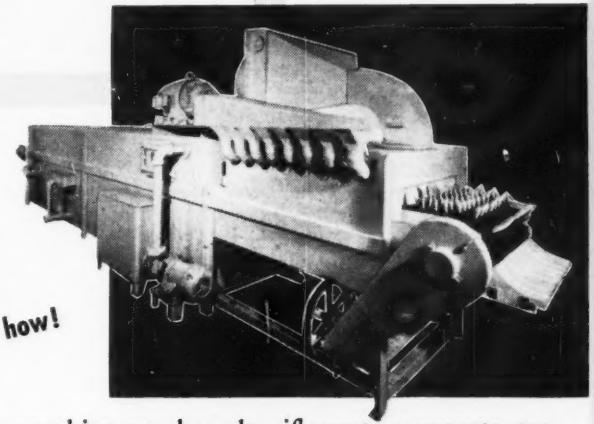

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Fig. 2—Tumbling barrel setup at the Norton Company for experimental work in metal finishing. *(Photo courtesy The Norton Company, Worcester 6, Mass.)*

ing 4,000,000. These parts range in size from tiny screws, washers and rivets to gray iron castings weighing about six pounds. Three thousand man-hours per week are saved over the former hand deburring methods.

The Norton Company's Alundum tumbling abrasive was developed during the last war when one of the large aircraft plants was pressed to find a faster method for deburring and forming uniform radii on a wide variety of aircraft engine parts. Figure 1 shows typical parts that have been finished by Alundum abrasive tumbling; Fig. 2 shows the tumbling barrel setup at Norton Company for experimental work. The improvement in finish by barrel tumbling is illustrated in Fig. 3, showing socket wrenches before and after tumbling.

In discussing metal finishing by abrasive tumbling before the 37th Annual Convention of the American Electroplaters' Society, Hubert M. Goldman, Enthone, Inc., New Haven, Conn., brought out a number of cost saving possibilities using modern tumbling methods. According to Goldman, abrasive tumbling may be used in its roughest form for the removal of "skin", scale, and fins from castings, and scale from forgings. A more carefully controlled operation will remove flash and burrs, wire edges, rough spots, scale, and rust and will cut down a metal surface to a uniform condition. Both operations will effectively blend in chamfers and formed radii or will round off corners and sharp edges. Still finer control can result in considerable surface finish improvement with respect to mi-

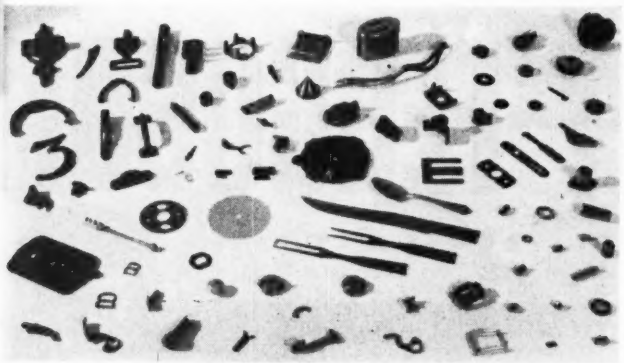

Fig. 1—Typical parts that can be finished using abrasive tumbling. *(Photo courtesy The Norton Company, Worcester 6, Mass.)*

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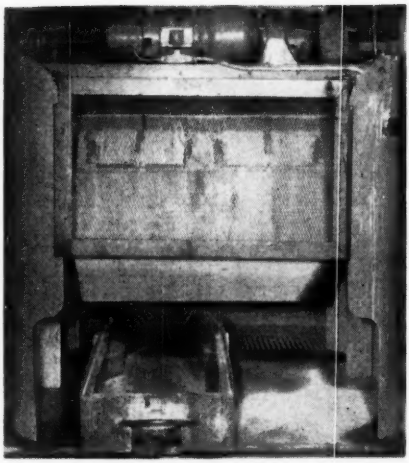
Fig. 4—A shop installation of a two-compartment, horizontally operated, octagonal barrel tumbling unit.
*(Photo courtesy Enthone Inc., New Haven, Conn.)*



cro-inch finish and with respect to color or appearance.

Other benefits of abrasive tumbling were pointed out by Goldman. One is the uniformity of the finish obtained, with the result that rejects can be reduced to an absolute minimum, often to zero. Every item entering the barrel in a uniform condition will be taken from the tumbling operation with a uniform finish. This advantage also occurs in deburring operations or in breaking of corners and edges. An additional benefit occurs in the form of partial or complete surface finishing of the parts while other operations such as deburring are being accomplished. The lack of necessity for specially trained personnel, such as required for polishing, and the mass production per unit of time add further to the reduction of costs.

### Barrel Finishing Factors

The Norton Company suggests that the following factors should be considered before any job is processed by abrasive barrel finishing:

Size and Shape of Parts. Consider any existing recesses, angles, fillets, slots, holes, blind holes, and intricate contours in selecting the grain size or mixture of sizes.

Kind of Metal and Its Hardness. Check the kind of metal, ferrous or non-ferrous, and if it is in the soft or hard state, as a basis for selecting the proper cleaner.

Size of Burrs. Normal or accessible burrs can be removed whether in the soft, pickled, or hard state. Best results are obtained when parts are in the hard state. However, reliable experience has shown that no existing tumbling method will replace a rough grinding operation to remove extra heavy burrs or burrs in hard-to-get-at-places.

Finish Required. Check blueprint or finish requirements for determining grain size and barrel speed.

Quantity to be Processed. Maximum work load for the tumbling barrel will have to be determined by experimental test runs for each part.

Tumbling Equipment. Check the available equipment to be sure it will meet the requirements of the various parts to be processed.

Grit Size. The grit size or mixture of sizes used should be such that the abrasive grains will reach all of the recesses, angles, fillets, and slots with-

Fig. 3—Socket wrenches before and after abrasive tumbling.
*(Photo courtesy The Norton Company, Worcester 6, Mass.)*

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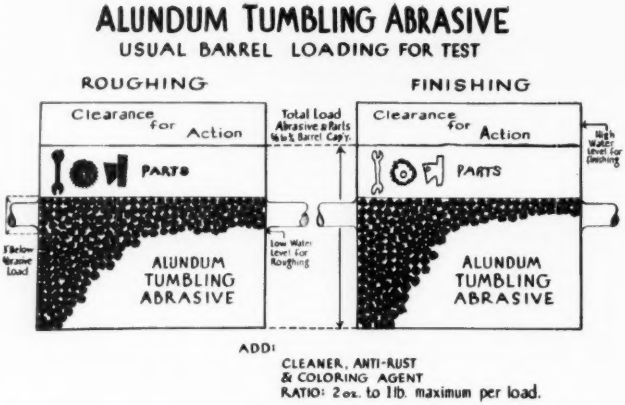


Fig. 5—Water levels in tumbling barrels for roughing and finishing. *(Illustration courtesy The Norton Company, Worcester 6, Mass.)*

out wedging and by-passing part of the surfaces.

### Equipment and Loadings

Satisfactory results from aluminum oxide abrasive tumbling have been obtained with the horizontal, octagonal type lined barrel, equipped with variable speed drives. The best and fastest results for general shop work have been obtained with barrels approximately 30 inches in diameter. The width or number of compartments can vary to meet requirements. The submerged barrel is also well suited for abrasive barrel finishing. The conventional tilted-type barrel, commonly used for burnishing or drying, has given fair results in abrasive tumbling; however, if this type is used the barrel should preferably be of a large diameter. Figure 4 shows a shop installation of a two-compartment, horizontally-operated, octagonal barrel tumbling unit. On large production lots, two to four parts of abrasive to one part of work, by volume, should be the average ratio. An average load usually consists of three parts of abrasive to one part of work by volume. The total load in all cases, and regardless of the amount of parts being processed, should reach up to ½ to ⅔ of the barrel or compartment used.

The volume of water to use with the aluminum oxide abrasive is very important in controlling the action in the barrel and the resultant finish on the work. In general, decreasing the amount of water will accelerate the grinding action and reduce the time cycle but will also give a rougher finish. Increasing the amount of water will retard the grinding action and produce a smoother finish. Thus, operations can be run at low water level for rapid grinding or roughing. By adding water to the same mixture, finishes can be improved further, employing a time cycle determined by the finish requirements. Figure 5 shows Alundum tumbling abrasive barrel loadings based on recommendations of the Norton Company.

Cleaners and compounds are sometimes added to the load of abrasive and water to give "color" or for cleaning the parts. Some are alkaline, others have an acid reaction, and still others are completely neutral. The choice of cleaner or compound depends upon the material being processed and the finish requirements. Oily parts should be cleaned before tumbling as they tend to retard the abrasive action. Sometimes it is desirable to use a rust preventive on tumbled parts. Parts should be thoroughly washed after the tumbling operation. Several drying methods are used. One method is to place the work in boxes or pans under batteries of infra-red lamps.

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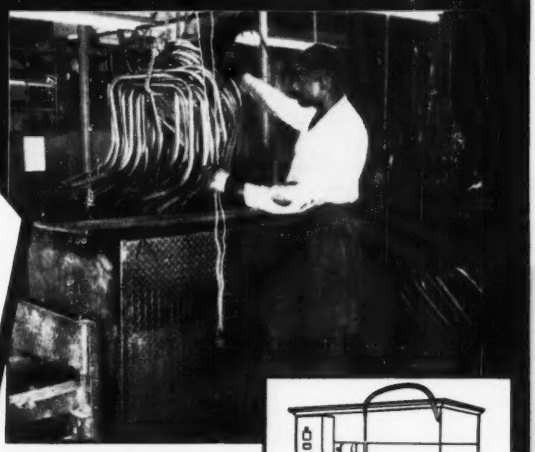

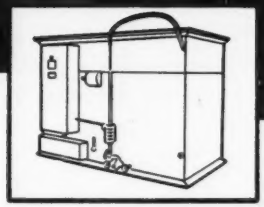

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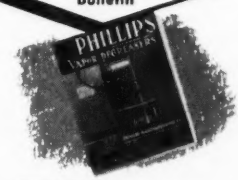


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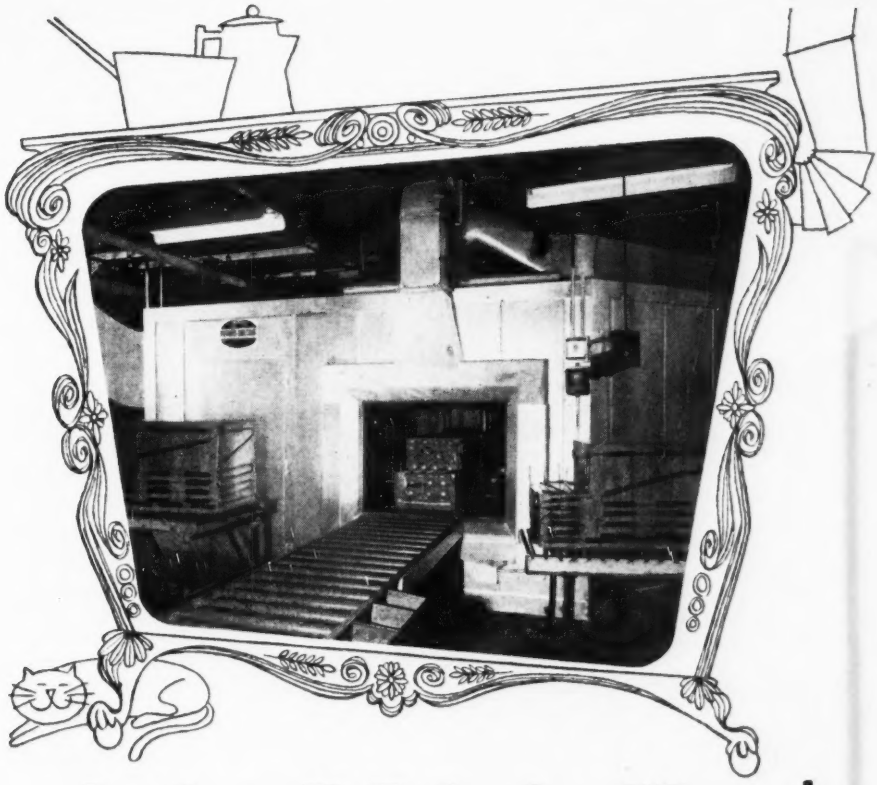
Kellerman Paint Co., New York, N. Y.
Grapek Paint Co., Newark, N. J.
M. Buten & Sons, Inc., Philadelphia, Pa.
R. W. Renton Co., Cleveland, Ohio, Indianapolis, Ind.
Dean & Barry Co., Columbus, Ohio
Vic Miner Co., Toledo, Ohio
Abrasive & Supply Co., Detroit, Mich.
Melson Industrial Supply Corp., Grand Rapids, Mich.
O'Donohue Sales Co., Milwaukee, Wis.
Paints & Lacquers, Inc., Chicago, Ill.
Tanner & Co., Indianapolis, Ind.
Metal Goods Corp., St. Louis, Mo., North Kansas City, Mo., Dallas, Texas, New Orleans, La.
Hubbard & Stau, Los Angeles, Calif.
M. E. Smith Co., Los Angeles, Calif.
C & H Supply Co., Seattle, Wash.
Hugh Russel & Sons Ltd., Montreal & Toronto, Canada



# An Oven To Bake Out Water!

WATER in the coils of a refrigerating system is as harmful as water in the carburetor of a car. So Kelvinator runs a special gas-fired oven to dehydrate its refrigerating units at the Detroit plant.

The oven shown here reduces the moisture in tubing of coils and evaporators to an absolute minimum—0.03 grams per coil.

Inside the 19 foot square gas oven is a revolving table which rotates to carry the units through the dehydrating cycle. Coils of the units are connected to a compressed air source, and air at the rate of .6 cubic feet a minute circulates through the coil while it is in the oven.

Oven temperature is maintained accurately and automatically at 275°, with a plus or minus variation of only 5° The dehydrating process requires about ten minutes. 36 of the units shown here (for freezer chests, beverage coolers, etc.) are handled each hour. When the oven is processing evaporators used in domestic refrigerators the rate steps up to 180 per hour.

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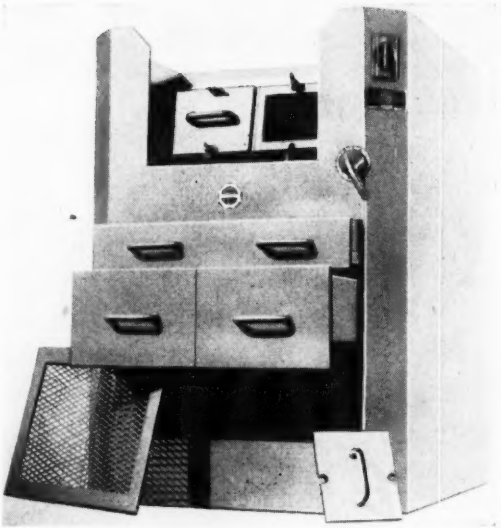
Fig. 7 — Typical rubber-lined tumbling machine for use with the "Roto-Finish" process.
*(Photo courtesy The Roto-Finish Co., Kalamazoo, Mich.)*



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ings, forgings, extrusions, machined parts, or die castings, from small parts weighing considerably less than an ounce to intricately shaped parts weighing as much as 75 pounds each, have all been finished by the Roto-Finish method. Figure 6 shows a number of miscellaneous parts so treated.

The machine in which the various Roto-Finish processes are performed is essentially a motor-driven, horizontally-operated, octagonal cylinder, typical of that shown in Fig. 7. The smaller "Midget" type tumbling machines are used for small loads of moderate size parts, or for loads of very small parts. A typical cycle of a load of parts using the Roto-Finish tumbling process involves the following steps:

1. Load mass and parts into compartments of the machine. The simplest method is to use a hoist pan lifted by an electric hoist operating on an overhead bridge crane.
2. Add the recommended amount of water and the specified compound.
3. Clamp the loading doors in position.
4. Start the cylinder to rotating and allow parts to process for the recommended time.
5. Remove parts and mass from the machine by dumping into hoist pan.
6. Separate parts and mass from the machine by dumping into hoist pan.
7. Dry parts and send to next operation.

*to page 84→*

●

Fig. 6—These miscellaneous parts have been finished by the "Roto-Finish" tumbling method.
*(Photo courtesy Roto-Finish Co., Kalamazoo, Mich.)*

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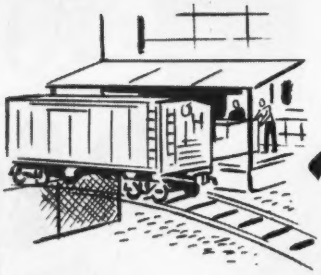

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Many KIRK & BLUM Industrial Ovens, although designed and built to specifications, are shipped completely assembled and tested, ready to operate. Once "spotted" in your plant, they can be connected and in operation in a few hours, saving time and expense.

Illustrated at right is a representative group recently shipped to well known industrial firms. From left to right: core-mix drying oven. Two moisture evaporation ovens for chemical powders. Moisture removal oven for carbon electrodes. A conveyorized oven for drying insulating varnishes.

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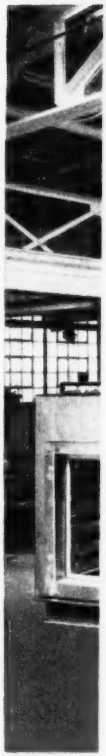

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# INDUSTRIAL OVENS

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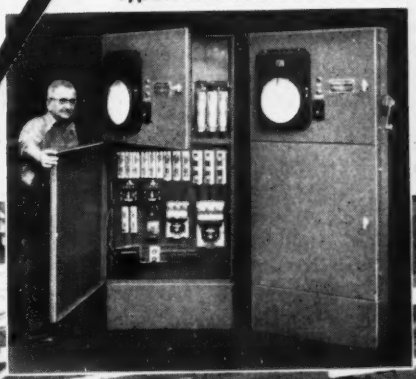
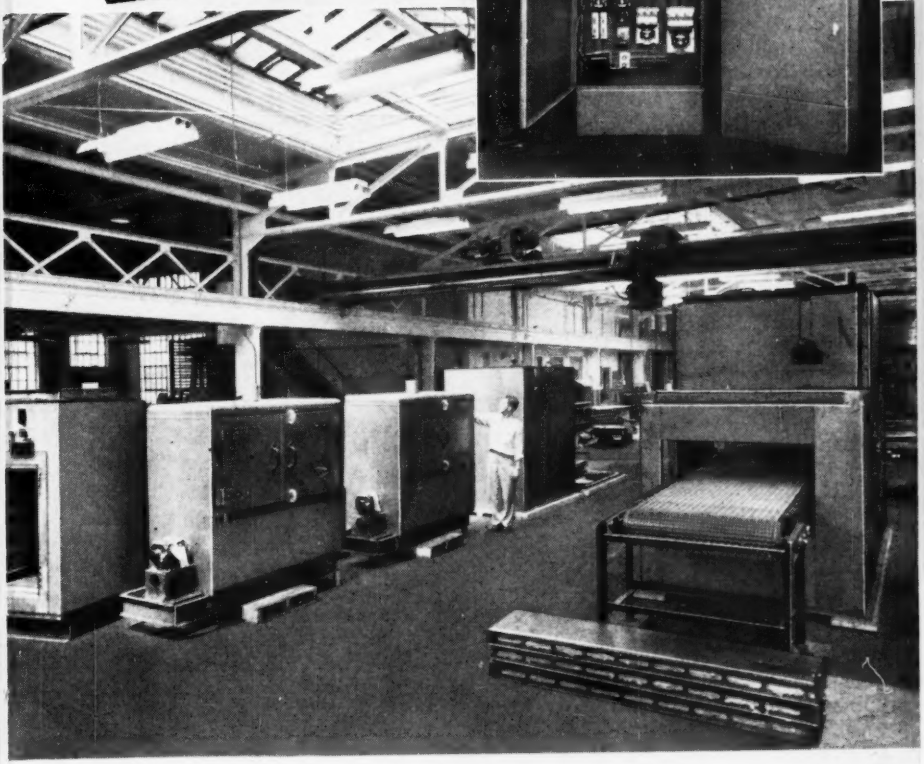


Typical Kirk & Blum Oven Control.



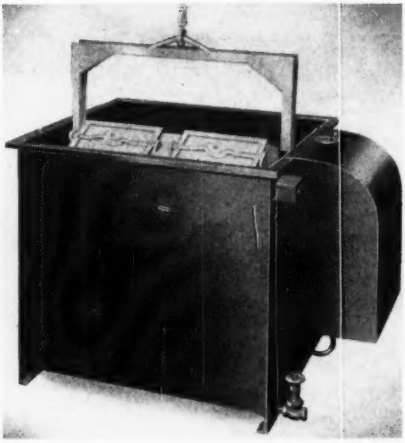


Fig. 9—A submerged type barrel used for finishing delicate parts and for producing finishes and colors on parts that cannot be done satisfactorily in the regular type barrel. *(Photo courtesy Almco, Albert Lea, Minnesota)*

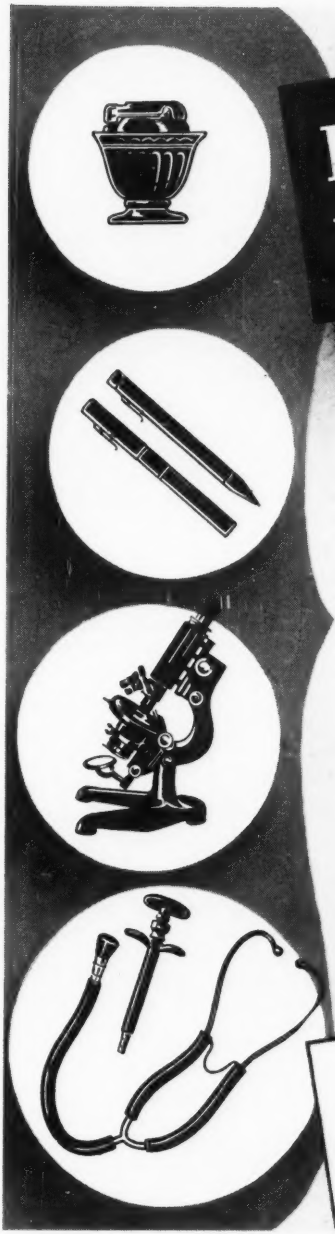
As a general rule, the labor savings resulting from tumbling operations are especially noticeable in finishing small die castings. A medium-size maker of automotive parts and plumbing hardware has used six Roto-Finish units with a single operator to deburr an average of 12,000 pieces in five hours. The process is also employed to grind, buff, polish or hone small die castings and small stampings.

A precision tumbling method using a combination of chips, compounds and water has been developed by the Almco Division, Queen Stove Works, Inc., Albert Lea, Minn. The process, known as "Supersheen," uses equipment typical of that shown in Fig. 8, and can be used for deburring, cutting-down, finishing to micro-fineness or for coloring of ferrous or non-ferrous parts.

Figure 9 shows a submerged type barrel recently developed by "Supersheen" for finishing delicate parts and for producing finishes and colors on parts that could not be done or equalled in the standard type barrel. Figures 10, 11, 12, and 13 show before and after views of typical parts that have been finished by the Supersheen tumbling process.

One advantage claimed for the Supersheen process is the large volume of production that is possible—up to 4000 pieces processed at one time. On fine precision parts the process may be held to within 0.0002-inch tolerances. In tumbling operations on gear tooth surfaces, the surface approached run-in condition and the absence of semi-loose particles prevented oil contamination. Precision tumbling may also improve the finish

Fig. 8—This barrel tumbling equipment is used in finishing with the "Supersheen" process. *(Photo courtesy Almco, Albert Lea, Minnesota)*



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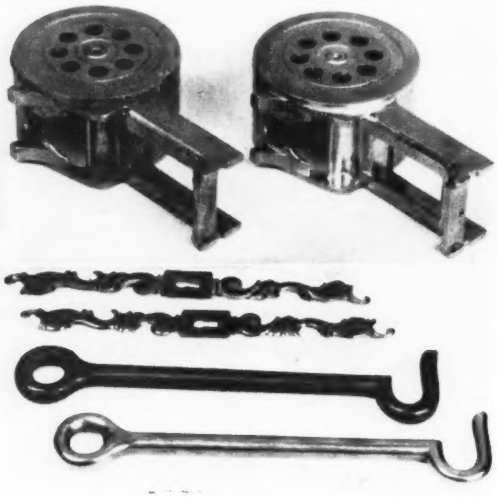
Figs. 12 and 13—Before and after views of typical parts that have been finished by the "Supersheen" tumbling process.
*(Photo courtesy Almco, Albert Lea, Minnesota)*

on threaded parts. In a review of ten Supersheen tumbling installations, it was claimed that finishing costs averaged 80.1 per cent less than former methods — from 48 per cent on a threaded iron pipe "T" to 95 per cent savings on a steel trigger with complicated configuration.

**Dry-Tumbled Finishes**

Dry tumbling methods have been found to have some advantages in finishing certain types of metal parts such as zinc and aluminum die castings. Tumb-L-Matic, Inc., has recommended its dry "Thumb-L-Matic" process for certain operations on the basis that it smooths the metal without penetrating the outer surface. In dry tumbling, there are three degrees of finishing: cutting, smoothing, and polishing. The first of these is comparable to greaseless or fine polishing, but doesn't shape the part. Edges may be radiused or light burrs removed, but heavy fins or large imperfections are not affected except after prolonged cutting cycles. The second process is equivalent to a cutdown buff with tripoli, and tends to smooth out surface imperfections. The third, or finishing operation, can be used to impart a jewelry-type finish. Dry tumbled aluminum die cast food choppers have developed polished surfaces almost as brilliant as electroplated finishes. Figure 14 shows a typical barrel manufactured by Tumb-L-Matic, Inc.



Figs. 10 and 11—Before and after views of typical parts that have been finished by the "Supersheen" tumbling process.
*(Photo courtesy Almco, Albert Lea, Minnesota)*

# Ohio FUME AND DUST REMOVAL SYSTEMS
## TANGIBLE DOLLAR SAVERS

● Records on hundreds of Ohio Blow Pipe jobs prove without question that production output materially increased and employee absence and complaints radically decreased after the installation of an Ohio System for ventilation of fumes from plating and rinse tanks and dust collection from grinding, polishing and buffing.

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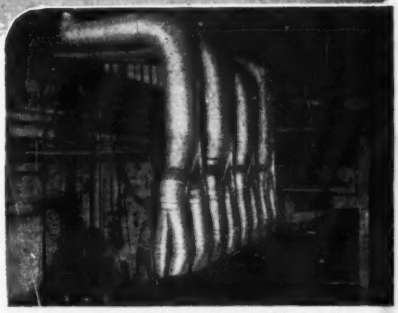
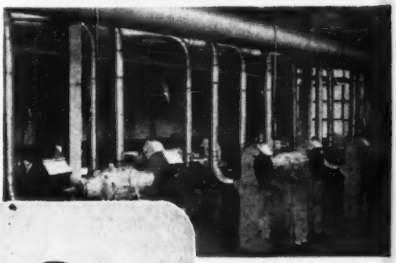


Fumes Removal Installation in Plating Room



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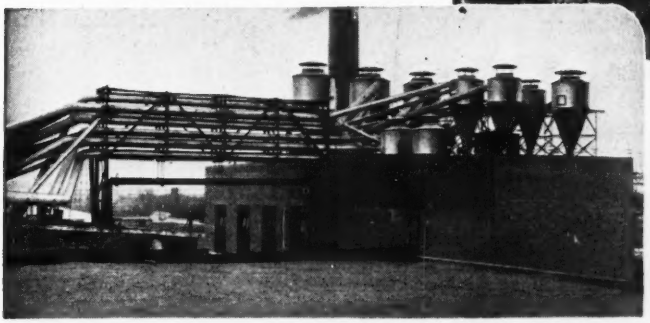

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Fig. 15—View showing concentration of parts and burnishing materials in narrow space of Abbott vertical burnishing barrel. This concentration arrangement exerts a downward thrust on the parts to be burnished.
*(Photo courtesy The Abbott Ball Co., Hartford 10, Conn.)*

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### Tumbling Aircraft Parts

D. J. Kaharl has recently described some of the barrel finishing processes used at Pratt and Whitney on aircraft engine parts. (See also "The Iron Age" —July 13, 1950.) Small flanged steel parts are processed in a 4 cu. ft. rubber-lined Hartford steel ball barrel at the rate of 2500 pieces per charge, with 200 lb. of No. 4½ Super-Honite chips, ¼ lb. of No. 2-3M compound (Minnesota Mining), and enough water to cover the charge. After running for three hours, all burrs are removed and surfaces are honed to desired smoothness. In another application, aluminum nipples, threaded outside, are run for 1½ hours in a Roto-Finish barrel. All burrs are removed and all surfaces honed smooth, yet the threads are unharmed and within tolerances. In the case of a flanged cast aluminum bearing, 300 pieces per compartment are tumbled 1 hour at 16 r.p.m. in a 32-inch Roto-Finish barrel.

Valves are tumbled in an Almco DBO-1 barrel with suitable chips, compound, and water to smooth surfaces and remove tool marks. Stainless steel vanes for jet aircraft engines are made appreciably smoother and edges are rounded within tolerance by a 6-hour tumbling run in a Roto-Finish barrel with chips, compound, and water.

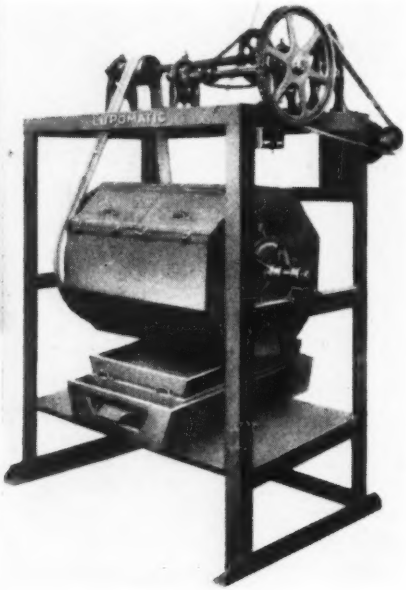


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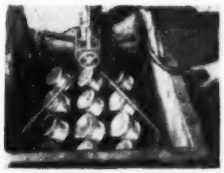
Fig. 14—A typical dry barrel manufactured by Tumb-L-Matic, Inc., for dry cutting and smoothing of metals and for lustering and cutting of plastics.
*(Photo courtesy Tumb-L-Matic, Inc., New York 70, N. Y.)*

## IN "PRODUCTION-LINE" CLEANING

# Vapor Degreasing CAN SAVE YOU TIME . . . SPEED YOUR OUTPUT



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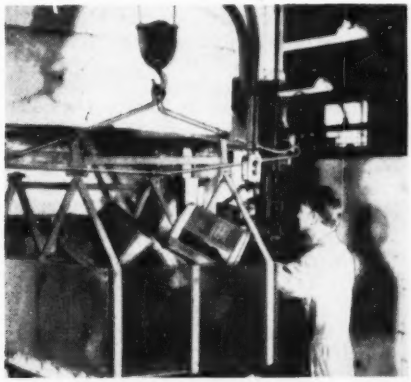

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Small dome-ended brass plugs are tumbled in quantities of 8,000 without chips but with compound and water using an Almco DBO-1 barrel.

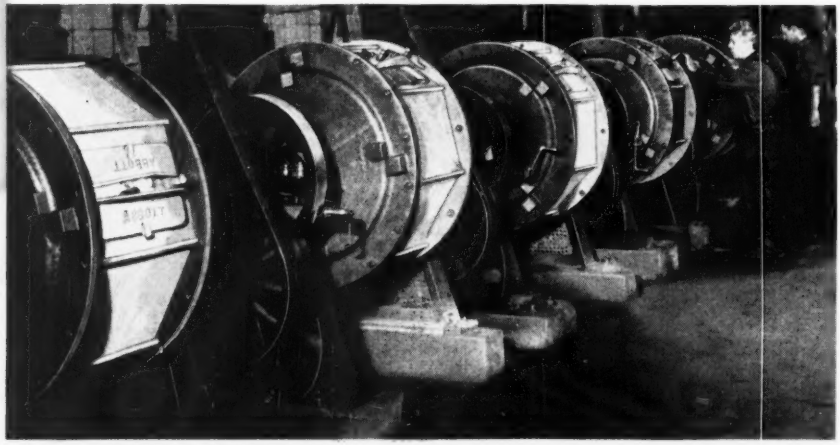
### Ball Burnishing

Barrel ball burnishing is designed to produce a bright finish on parts that already have a clean, smooth surface. Thus, ball burnishing is not an abrasive operation and will not remove burrs. The process is also designed to produce a bright luster on either plated or unplated parts. According to the Abbott Ball Company, results in ball burnishing are secured by the pressure of steel balls rolling over the parts in a solution of soap and water. The efficiency of the process thus depends on that pressure. The high and narrow design of the Abbott vertical burnishing barrel, shown in Fig. 15, confines the weight of the burnishing mixture within a narrow area. This concentrates the pressure just where it is needed—directly on the parts being finished. Abbott claims that the vertical barrel rather than a horizontal barrel is the right barrel for more than 90 per cent of all ball burnishing applications.

The proper barrel speed is determined not so much by the metal involved as by the size and shape of the pieces. In an Abbott barrel, moderate speeds of 15 to 18 r.p.m. are recommended. A mixture of cones with burnishing balls provides a good polishing medium. The purpose of cones, slugs or any other burnishing shape is to assure contacts in angles or corners that could not be reached by a round ball. In general, from two to three parts of burnishing balls by volume are used to each part of work. Small quantities of work may be burnished with a full load of balls. The burnishing balls should also be perfectly clean, that is, free from any scum or dirt that might accumulate on their surfaces over a series of burnishing operations. Burnishing balls can be kept in excellent condition by running them in the barrel for 10 minutes after every two

Fig. 16—A battery of Abbott burnishing and cutting down barrels in operation at the factory of a large tool manufacturer. Eleven barrels of this type are operated 24 hours a day by one 30 h.p. electric motor. Latest trend is toward individually-powered barrels eliminating overhead shafts and belting.

*(Photo courtesy The Abbott Ball Co., Hartford 10, Conn.)*



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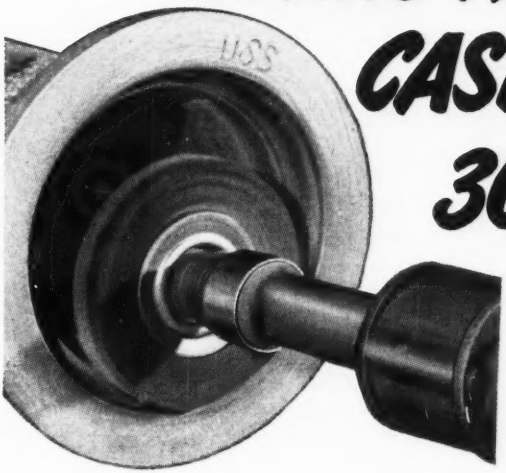


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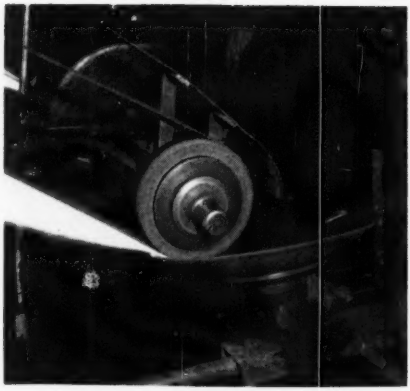
Fig. 17—Polishing disk harrow blades on belt backstand using special revolving work cradle. *(Photo courtesy Behr-Manning Corp., Troy, N. Y.)*



or three loads of work. This cleaning operation can be carried out with fresh water and a cupful or two of caustic soda. Figure 16 shows a setup for ball burnishing at a large tool factory.

No one tumbling medium can be most economically and most satisfactorily used for all types of barrel finishing operations. Thus, a solid aluminum oxide abrasive would not be expected to produce a higher gloss than that produced by a hard, smooth pebble. On the other hand, a part requiring considerable abrasion for the removal of a rough surface would be more quickly processed with a solid abrasive media than with a media consisting of very fine abrasive bonded with rubber or a ceramic It is important that each complete operation be studied with respect to the proper media to be used. In some cases, it may be advisable to use one type media for the first or cutting operation, and another to obtain a high degree of color or the ultimate in surface finish.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In Fig. 17 disc harrow blades are being polished on a belt backstand using a special revolving work cradle.

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**Savings in operations following pickling**—since thorough acid removal prior to such operations prevents contamination of lubricants, and thus increases life of dies and other tools . . .

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Data have been published by the Armour Coated Abrasive Division which emphasize that the efficiency of backstand units for grinding and finishing flat and curved surfaces is due to a large extent to the versatile contact wheel. In contrast to the hard face of the abrasive set-up wheel, the cushioned face of a contact wheel eliminates shock on the initial contact and permits smooth even grinding action. Because the cushioned face enables the grinding surface to be distributed evenly over high and low spots, it is not necessary to grind high spots flush to get at the low spots. As a result, production is increased because grinding time per unit is greatly reduced.

Contact wheels for use with coated abrasive belts are now available for every type of metal product finishing, with the particular operation dictating the selection of the contact wheel. This selection is highly important to the success of the abrasive belt operation. Some suggestions for selection of the proper contact wheel for various finishing operations were given by E. E. Oathout, Behr-Manning Corporation, before the 37th Annual Convention of the American Electroplaters' Society. Wheels are available in canvas, cloth, leather, felt, rubber, combined cloth and rubber, and cork, all in suitable densities, and all designed for specific operations. They can also be obtained with a smooth or serrated face for polishing or grinding. When selecting the contact wheel for any given operation, full consideration must be given to the type of work being done.

Fig. 19—Polishing magnesium castings used as parts in an aerial camera at Fairchild Camera & Instrument Company. It is reported that by switching to a backstand belt grinder, the company in a test run on 600 magnesium camera cones saved about 66 per cent time.
*(Photo courtesy Minnesota Mining & Mfg. Co., St. Paul 6, Minn.)*

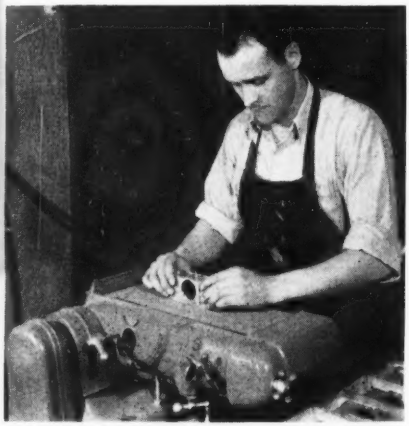


Fig. 18—Use of abrasive belt method to finish grind and polish a zinc die cast camera part at Clarius Camera Co., prior to plating.
*(Photo courtesy Minnesota Mining & Mfg. Co., St. Paul 6, Minn.)*

Experience has proved that serrated contact wheels in leather, rubber, and composition rubber and canvas are ideal for the rugged stock removal grinding job. However, if contour grinding and polishing work is to be done, a more flexible contact wheel is needed. These contour wheels must be resilient enough to allow the flexible,

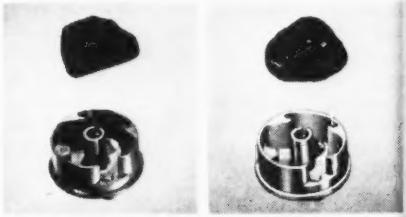
# Tests prove new chip toughest ever produced!

Look at the pictures below! Operations like this tested "Super Honite" against granite abrasive chips under identical conditions. Result: "Super Honite" cut faster, gave smoother finish, lasted twice as long. It can do the same for you on grinding *or* finishing jobs.

And "Honite" gives the same kind of performance on fine finishing to close tolerances—on many other jobs involving a minimum amount of metal removal. It's the world's fastest-cutting *natural* barrel finishing abrasive.

Like all stones, "Super Honite" and "Honite" work best in combination with "Honite" Compounds—the "secret of success" for dependable finishing results.

To help you choose the right 3M Barrel Finishing combination, 3M Engineers are ready to give you a free analysis of your operation. Use coupon below for complete information and a copy of "3M Barrel Finishing."



**FIVE TIMES FASTER CUTTING!** *Granite chip, left, lost cutting edges rapidly, required 22½ hours to finish casting. Tough "Super Honite" chip stayed razor-sharp, cut tumbling time to four hours! Note mirror-smooth surface.*

Minnesota Mining & Mfg. Co.
Dept. PF-10, St. Paul 6, Minn.

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Firm.....

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coated abrasive belt to reach the various contours to be finished. Such contact wheels are made of high-count cloth, properly folded and stitched into buff sections and held together with metal flanges in the proper face width to ensure solid wheel edges beneath the coated abrasive belt although still providing proper resiliency and fast cutting action.

One of the important advantages to be derived from the belt-backstand polishing method is the fast rate of cut. This is due primarily to the inherently sharper coating of the coated abrasive belt as compared to set-up wheels. The fast time results in less time per piece to be polished, and thus less labor cost per piece per operation and a higher production per day per man. A second advantage of the method is that it is frequently possible to reduce the number of operations necessary to produce a certain finish. This is done by skipping one or more grit sizes and thereby taking larger steps between operations.

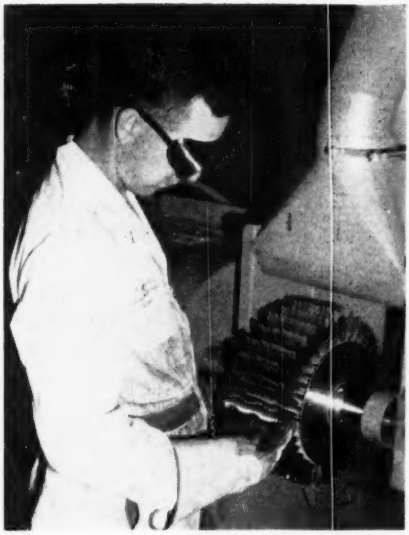


Fig. 21—The Vonnegut brush-backed sander head readily conforms to irregular contours and produces a fine uniform finish on many types of metal parts.
*(Photo courtesy The Carborundum Co., Niagara Falls, N. Y.)*

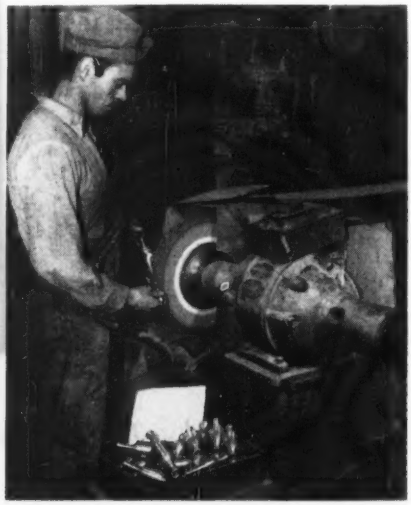


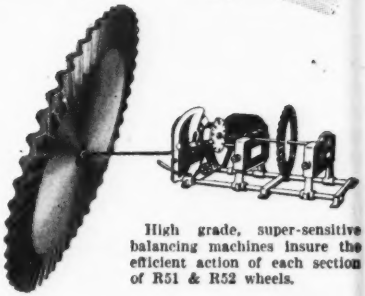
Fig. 20—Finishing cast yellow brass fireplace fixtures using the abrasive belt backstand method.
*(Photo courtesy Behr-Manning Corp., Troy, N. Y.)*

Figure 18 shows finish grinding and polishing of a zinc die cast camera part, prior to plating, at the Clarius Camera Co., Minneapolis. According to data supplied by Minnesota Mining and Manufacturing Company, a three-step operation is used, going from grit 100 to 180 to 240, and the 240 grit belt is washed in petroleum spirits to "unload" zinc chips. Figure 19 shows a polishing operation on a magnesium casting used as a part in an aerial camera at the Fairchild Camera & Instrument Company. By switching to a backstand belt polisher, in a test run on 600 magnesium camera cones, it was reported that the company saved about 66 per cent of the production time. Figure 20 shows a finishing operation on cast yellow brass fireplace fixtures using an abrasive belt on a Hammond lathe

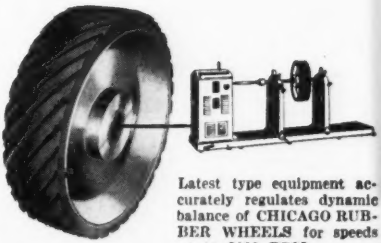
In contact-wheel grinding and polishing operations, as in any operation that involves wheels rotating at high speeds, proper balance is a very important factor in efficient and profitable operation. Therefore, all CHICAGO RUBBER wheels and *wheel sections* are dynamically balanced for operating speeds up to 3000 RPM. This means time saved from balancing on the shaft; space saved, for balanced sections can be made up to balanced wheels of the size you need, and money saved and made in smooth chatter-free operation always.

This factor of balance is typical of how CHICAGO RUBBER engineering strives always to make its products better for you. That same engineering skill can be applied to your individual grinding and polishing problems. A letter of inquiry will bring this experience and knowledge to you.

**In ordering wheels, it is very important that you state the exact operating speed that you use.**



High grade, super-sensitive balancing machines insure the efficient action of each section of R51 & R52 wheels.



Latest type equipment accurately regulates dynamic balance of CHICAGO RUBBER WHEELS for speeds up to 3000 RPM.

*"IT'S THE WHEEL THAT DOES THE WORK"*

**CHICAGO RUBBER COMPANY, INC.**

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2620 N. Clybourn Ave. Chicago
Makers of the COSMOWHEEL

with idler backstand.

Another benefit that has been cited for abrasive belt backstand polishing methods is that less experienced operators are required. One reason why a shorter training period for operators is required as compared with set-up wheels is that the contact wheel maintains its shape, diameter and action. Still another factor is that the coating of the belts and their rate of cut are more constant than may be expected with set-up wheels. In one production line operation of deburring die castings, the work was done in 6 seconds when the belt was new and in 7 seconds when the belt was ready to be discarded.

In some finishing operations, a lubricant is applied to the belt in the form of a grease stick or some special lubricant. One proprietory compound manufactured by Wagner Brothers, Detroit, is known as "Belt-Life" and is said to be equally effective as a lubricant on wet or dry type belts. The lubricant may be applied to the belt by an automatic liquid applicator, also manufactured by Wagner. The lubricant is said to reduce the loss of abrasive and lengthen the life of the belts. The savings in belts is said to be especially outstanding when work is on hard, sharp cutting edges. A better polishing job is reported with the lubricant especially on parts with concave or convex surfaces.

Fig. 22—Finishing Buick bumpers on an abrasive wheel.
*(Photo courtesy The Exolon Company, Tonawanda, N. Y.)*

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DETROIT
HANDY "TAC" RAG
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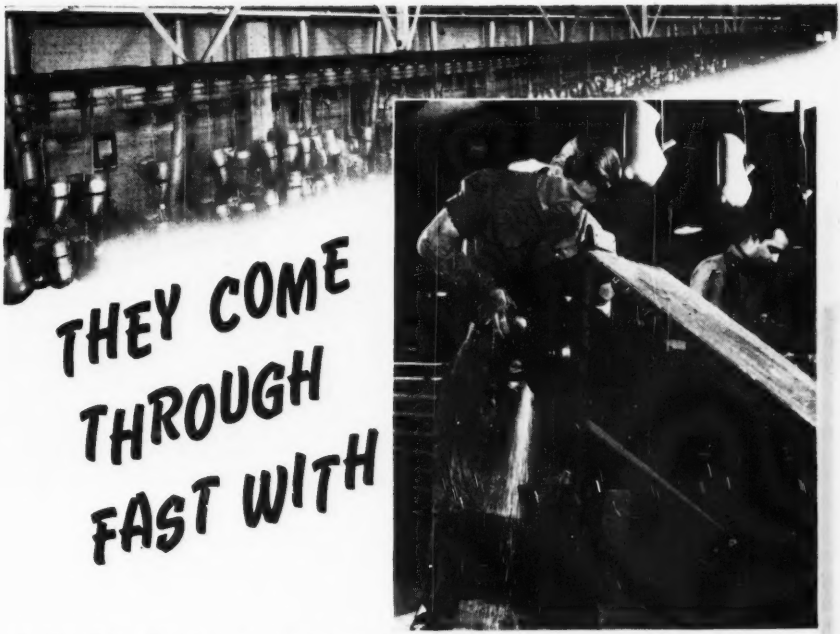
Standardize on DETROIT HANDY "TAC" RAGS and stop losses due to rejections. Specify "DETROIT" for removing all particles of dust, lint and sand. Try this modern method today. Order from your supplier at once, or send for sample.
DETROIT HANDY "TAC" RAG
DETRO MFG. & SALES CO., INC., CULVER CITY, CALIF.


The Carborundum Company, manufacturer of coated abrasive belts, in conjunction with the Vonnegut Moulder Company introduced the Vonnegut brush-backed sander head to the finishing industry. Designed especially for finishing irregular surfaces, it has the ability to adapt itself to the contour or irregular surface of the work by means of its shredded abrasive tips, which are pressed into every groove and depression. It follows the contour of the surface with ease and produces



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# RESINALL® METALITE® CLOTH BELTS

The preplating polishing of auto bumper guards becomes a high speed, low-cost production process with these RESINALL METALITE abrasive belts. With the right contact wheel, the belt easily adapts itself to the contours of the job. And with each aluminum oxide grain held securely in its original cutting position, like a lathe tool gripped by its tool holder, RESINALL METALITE Belts continue their abrasive action long after ordinary belts are worn out. No rubbing and no excessive loading, either. The heat-proof bond won't soften under the heat of continuous production finishing.

See this profitable production method in action. Our Field Engineers can show you in your own plant, or in a nearby BEHR-MANNING Demonstration Room. Make a date now.

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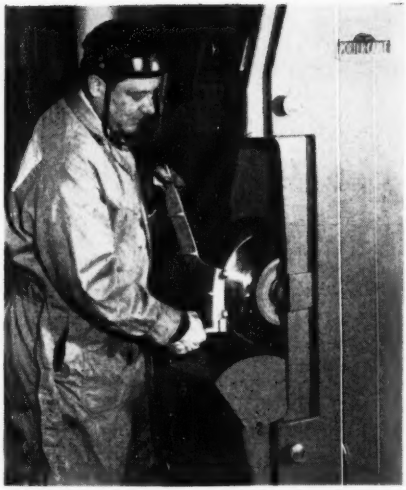
Fig. 24—In this application of abrasive belt finishing, a rubber wheel is used at the point of contact between work and the belt. *(Photo courtesy Chicago Rubber Co., Inc., Chicago 14, Ill.)*



a fine uniform finish. In general, the Vonnegut brushed-backed sander method is thought of as a pre-buffing or blending tool, and is not considered suitable for stock removal. It is adaptable to automatic or semi-automatic operations as well as to hand application. Figure 21 shows the Vonnegut[1] method being used to polish a typical metal part.

### Mechanical Flat Polishing Prior To Forming

Pre-polishing steel sheets in machines equipped with abrasive belts has shown advantages such as: boost in production; reduction in labor for hand polishing; and a more uniform finish from day to day. Pits, seams, slivers, and other surface imperfections are removed while the steel is in the sheet, coil, or blank form. After forming, parts are then ready for the finishing operation that is to follow. Machines are also available for polishing flat metal blanks utilizing abrasive belt polishing methods with a conveyor belt feed. Figures 22, 23 and 24 show some polishing operations on partially finished work with abrasive belts.

[1] For further discussion of the Vonnegut brush-backed sander head, see PRODUCTS FINISHING, February, 1950.

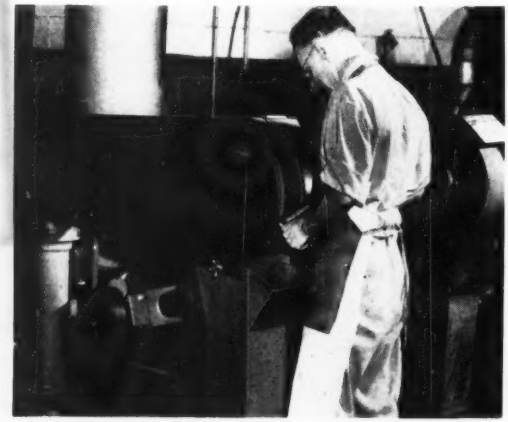


Fig.23—A small part is finished by using the abrasive belt backstand method. *(Photo courtesy Armour & Co., Chicago 9, Ill.)*

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On the basis of ten-year field tests, General Motors technicians have come up with the conclusion that the "chalking" of automotive paint finishes is not the result of oxidation but rather a reducting action in which hydrogen peroxide is formed from the effects of light and moisture and reacts on the lacquer film. Their findings are tentative but may have profound effect on the studies of all types of paint failures.

# Unichrome CLEAR Enamels

## add durability to a BRIGHT finish like this

This piece of brilliant door hardware was zinc plated and then made bright as chromium by treatment in Unichrome Dip. This was followed up by application of a really tough, clear enamel—Unichrome Coating B-115—to provide outstanding resistance to corrosion, handling and exposure.

This same, service-proved, non-yellowing baking synthetic is also ideal for use on chromium which has been deposited over thin nickel or no nickel at all. Here, too, you'll get the extra protection and adhesion needed for a dependable, durably bright finish.

Also available are durable, *light-fast* Unichrome Coatings to simulate gold, brass or copper colors on polished stainless steels and chromium.

Need help on a combination finish for your product? Write the Company that knows *metal* finishes as well as their requirements in *coatings*—United Chromium.

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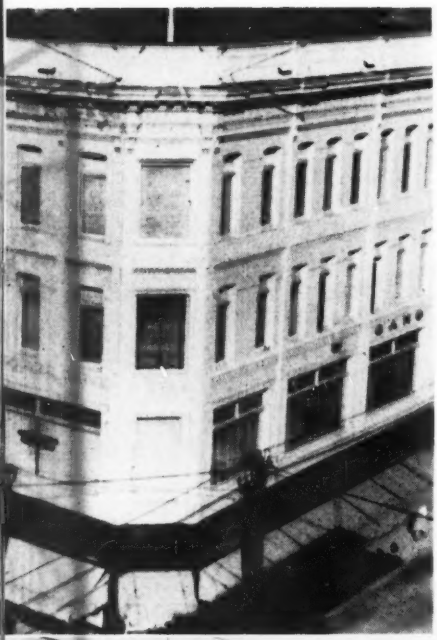
# PRACTICAL APPLICATIONS *of Modern Products*



## Face Lifting with Porcelain Enamel

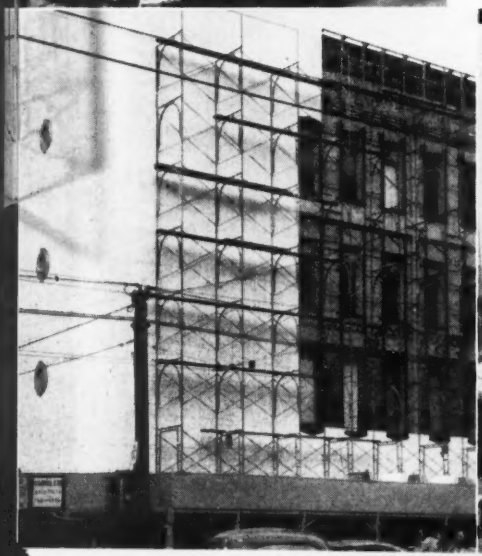
A VERY effective method of remodeling old-type structures with a modern use of a material that is centuries old—porcelain enamel—was recently illustrated in Denver, Colorado.

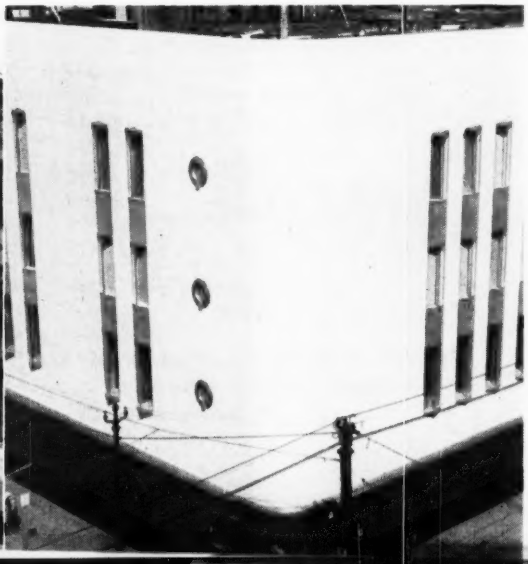
The object of the face lifting, Gano Downs' Department Store, had been built in 1880, and since it had settled, provided an interesting problem for the application of a modern fascia. Further considerations limited the material to be used since it had to be lightweight, be applicable to a stone wall, and form a rounded effect at the corners.

The architects, T. H. Buell and Company, selected Texlite life-time architectural porcelain enamel as the ma-

Fig. 1—(Above left) The building as it appeared in the old days.

Fig. 2—(Below) During remodeling, left, and the finished building, right.





terial that would satisfy the demands of modernizing this building's exterior walls, this material being economical, colorful, lightweight, permanent, and maintenance-free.

### Construction

Light 4-inch structural channels were bolted to the wall and special fabricated "J" type 16-gauge furring was welded directly to them. These furring strips were continuous at each horizontal joint, and allowed the hanging of each individual porcelain enamel panel as self-supporting.

The porcelain enamel panels were modular of 36-inch horizontal joints with the largest panel approximately 36 inches square. Special "J" type furring and panel construction allowed a $\frac{3}{16}$-inch caulked, trouble-free, weather-resistant joint.

The exterior of the building required approximately 12,000 square feet of architectural porcelain enamel. The course of the enamel is 50 feet 6 inches high, extending from the top of the canopy trim to the top of the parapet wall. The fascia extends 126 feet on one elevation and returns 9 feet into an alley. On the other street, the side extends 101 feet with a 28-foot wide course projecting back 42 feet over the adjoining building.

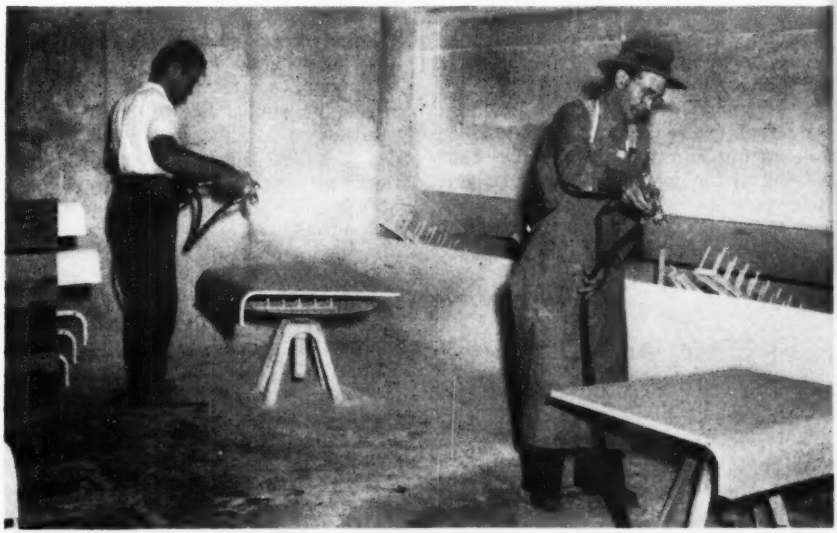
### Panel Fabrication and Finishing

The porcelain enamel panels, manufactured by Texlite, Inc., Dallas, Texas, were fabricated from 16-gauge special Armco enameling iron. The first step in the manufacturing process consisted of forming in a 700-ton press. Use of a special forming die enabled the company to do all flanging and forming in one operation.

In preparing the panels for the ground coat, they were first cleaned in an alkaline degreaser; etched in hydrochloric acid; and then immersed in a neutralizing solution.

The ground coat and two cover coats of acid-resisting full matte porcelain enamel were applied in 8-foot 18-inch

Fig. 3—Panels receive their final coating of porcelain enamel in this spray booth. Note compound radii used on corner for top of parapet wall.



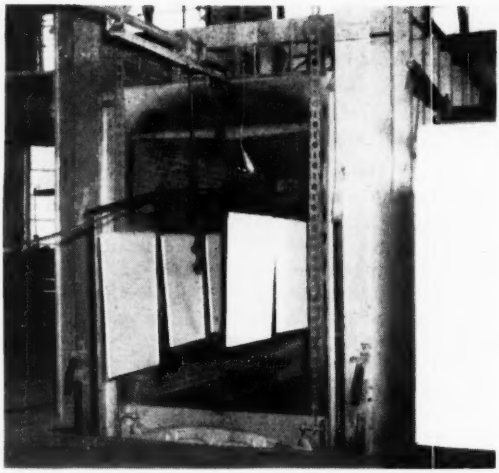


Fig. 4—Panels enter the enameling furnace where fusion takes place at 1575 deg. Fahrenheit.

spray booths with DeVilbiss spray guns. The guns used for this hand operation were equipped with special heads for the enamel slip. One heavy slush coat was used on the back of the panels.

The enamel coats were fused in a Ferro slot-in-roof intermittent operating type furnace. Firing time was from 3 to 5 minutes at 1575 deg. F. In the furnace the temperature was controlled by a recording Brown Potentiometer; on the ware, the temperature was controlled by Brown Radiamatic (Compensated Radiation) Pyrometers. The furnace, of radiant tube design, is 7 feet tall 13 feet long, 5 feet wide, and operates on high pressure gas of 6 pounds; 1050 British Thermal Units.

The panels were conveyed through the complete finishing process, from spraying to storage, on an overhead monorail using Inconel hooks.

Extreme care was used in handling the panels while trucking to the job site and during erection with special reinforcing at the corners for protection at these points.

## Safe Derusting and Interim Rust Prevention

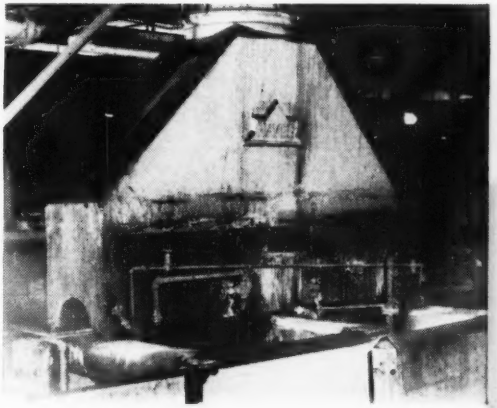
REMOVAL of rust from steel spools, without danger of attack on the base metal, is accomplished with the use of Magnus D-Scale-RW by a supplier of copper wire.

According to the Magnus Chemical Co., Garwood, N. J., the company in question uses from 800 to 4,000 six and seven-inch copper plated steel spools per day. The spools soon lose the copper plate and rust in varying degree, depending upon the care exercised by the wire customers before returning them to the supplier.

Formerly, degreased spools were hand brushed on a powered wire brush, a slow and expensive method. Now, the degreased spools are dipped in a hot solution of Magnus D-Scale-RW (190 deg. F.) for 7 to 10 minutes on the average (some spools require as little as 3 minutes). Spools are loaded in baskets —about 100 per load—given a cold running water rinse, and then dipped into a solution of Magnus 63, this alkaline cleaner neutralizing any traces of D-Scale-RW which might remain on the spools. D-Scale-RW is an inhibited acid cleaner, perfectly safe on metals for moderate periods of contact, but the alkaline cleaner is used as a security treatment. At the same time, Magnus 63 leaves a soap film on the spools which prevents their rusting during the interim between cleaning and re-use.

# If your processing calls for cleaning, pickling or plating—

## SPECIFY HAVEG EQUIPMENT!



Haveg equipment is exceptionally resistant to almost all acids, alkalies, salts and solvents—and this corrosion resistance is throughout its entire mass. Haveg is not a lining, coating or film, but a chemically resistant structural plastic. Scratches, gouges or chipping do not affect the corrosion resistance of the equipment.

And because it is a structural material almost any type of equipment can be made of Haveg—tanks, towers, fume duct, piping, valves, pumps, condensers, jets and many other types of equipment can be economically built of Haveg.

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| Delaware 7-6266 | Cherry 7297 | Hartford 64250 | Jackson 2-6065 | Madison 1575 | Mutual 8955 | Elliot 0890 |

Idler pinion gear is taken out of mud-filled bin at Caterpillar Tractor Company's Kansas City parts depot. During recent flood, 20 inches of mud and 20 feet of water covered the entire warehouse.

The method is so simple and effective that spools are now derusted every time they are returned to the plant. With the wire brush method they were only cleaned every third time.

## Nox-Rust Preserves Metal Parts During Flood

WHEN 20 feet of water sweep into a warehouse, its metal stock might easily be written off as a total loss—but that was not the result of the recent flood at the Kansas City parts depot of Caturpillar Tractor Company.

After the waters receded in the wake of the worst flood ever to hit Kansas and Missouri, Caterpillar began an immediate spot check of its metal parts stored there. This preliminary inspection of a few parts indicates that most of them withstood the ravages of corrosion due to a protective coating called Clear Coat, made by the Nox-Rust Chemical Corporation, 2429 S. Halsted St., Chicago.

This rust-preventive compound, which Caterpillar uses regularly for normal protection of parts in storage, resisted the attack of oozy mud and flood water. Thousands of metal parts, although drenched and covered with mud, came through unscathed.

In an emergency assembly-line clean-up system now being set up at the depot, all metal parts will be run through a steam cleaning operation, will be degreased with a special Nox-Rust cleaner, sent through a neutralizing tank, be given the second coating of the rust-preventive compound, and re-packaged for storage and shipment.

The steam will take off the mud, and the degreasing will remove the old coating, which is necessary because the sticky mud which clings to it may contain acids.

Essential to the success of the system is a rigorous inspection that will be given to each part before it is put back on the shelves. The inspection will be so thorough that it will be impossible to tell a part that went through the flood from one that comes fresh from Caterpillar's Peoria factory.

## Alodized Aluminum Enhances Appearance and Durability of Refrigeration Equipment

ONE of the many applications of specially treated aluminum is in the cabinet construction of commercial refrigeration equipment. Among the leaders in this field is the Nolin Manufacturing Company of Montgomery,

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# Superior Paint Performance

TO YOUR PRODUCT'S SALES FEATURES . . .

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## Bonderite

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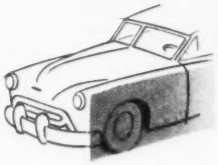
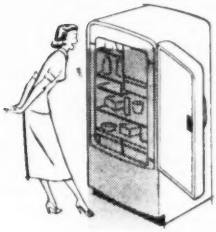
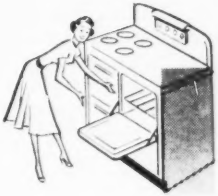


Quality products should look the part—on the showroom floor and in service. To guard the good looks of painted metal, leading manufacturers use Bonderite before painting.

Bonderite, Parker's corrosion resistant paint base, converts the metal surface to a nonmetallic phosphate coating, provides a sure anchor for paint and protection for the metal against the formation of rust and corrosion. Bonderite application is positive, quick, easy to control, dependable, low in cost, and effective on products that range from automobiles and trucks to kitchen mixers.

*Your* painted metal product should have the assurance of superior paint performance that Bonderite brings. Full information is yours on request.





Write for your copy.

**Parker Products meet government specifications**
Available for your guidance—a list of government finish specifications and the Parker Products which meet their requirements.

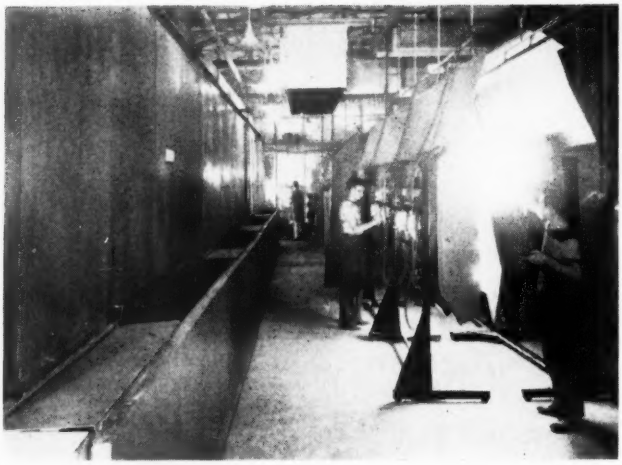
*Bonderite, Parco, Parco Lubrite—Reg. U.S. Pat. Off.*

PARKER

Parker Rust Proof Company

2172 East Milwaukee Avenue, Detroit 11, Michigan

BONDERITE—Corrosion Resistant Paint Base • PARCO COMPOUND—Rust Resistant • PARCO LUBRITE—Wear Resistant for Friction Surfaces



In this view of the Nolin plant, the five-stage washer may be seen at the left, the painting operations in the rear, and the drying oven at the right.

Alabama, which uses the Alodizing process to produce a lasting bond on aluminum for its coatings.

Applied to such Nolin products as dry beverage coolers, walk-in coolers, and double-duty display cases, the Alodized aluminum is finished with white, gray, blue, tan, and brown baked enamel, thus providing a finish that is attractive, durable, and wear-resistant.

### Alodizing Process

The Alodizing operation, which is non-electrolytic, starts when the cut and formed aluminum panels are hung on a conveyor line in the sheet metal department. Traveling at a rate of about 2 f.p.m., the panels undergo the following operations in an automatic power spray washer:

Stage 1—Duridine cleaning bath.
Stage 2—Cold water rinse.
Stage 3—"Alodine" *coating bath.
Stage 4—Cold water rinse.
Stage 5—Deoxylite—acidulated rinse.

This washer, designed and built by the Nolin Manufacturing Company, is approximately 85 feet long, this length being necessary since many of the panels to be treated are 10 feet in length. The washer has five separate tanks, one for each stage. Also, each tank has its own individual power spray system.

From the washer, parts are air-dried while traveling to the spray booth. Here the desired finishes, such as a one-coat hammer finish for beverage coolers, or a primer and two finish coats for meat display cases, are applied. The various finishes are sprayed on with air guns and the paint booths have water falls in the rear to collect overspray.

The final finishing operation consists of baking the enamel at approximately 300 deg. F. in a Fostoria oven, which has a 24-foot long bank of infra-red baking lights. Finished coolers and other low-temperature cabinets are then completed in the final assembly department.

---

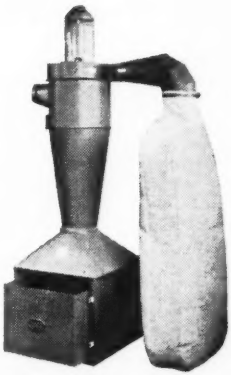
* *"Alodine" Trade Mark Reg. U. S. Pat. Off. by American Paint Company.*

---

Collapsible antennas for automobile radios are usually made of Monel, a nickel-copper alloy, because of its good mechanical properties and excellent resistance to corrosion in a wide variety of atmospheric conditions. These antennas are thin chromium plated in accordance with the Society of Automotive Engineers' specifications.

## *You've got the "Number" on Abrasive Dusts when You Use* TORIT

# DUST SEPARATORS



Here you are folks. Step right up and watch the sparks and dust go 'round and 'round. Off the wheel they fly, but not into machinist's eyes.

You hold the winning number when dust-creating machines are equipped with Torit Dust Separators. Compact and powerful, they trap dust at its source. Heavy particles are removed by centrifugal action and, with after-filter as shown, the remainder is cleaned to permit recirculation of the air.

Keep production spinning with Torit dust collecting equipment. There are models and sizes for every standard machine. For complete information and latest Torit catalog, write:

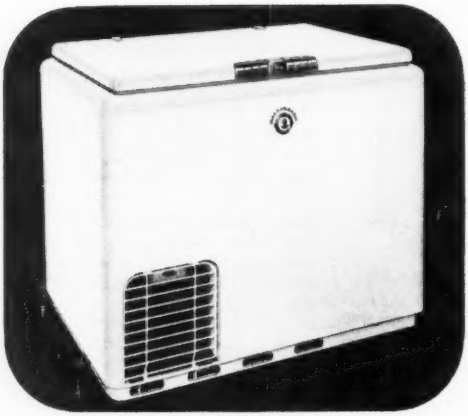
**TORIT Manufacturing Co.**

314 Walnut Street St. Paul 2, Minn.

# Finishes

A quantity of 10-ton tandem platform military-type Trailmobiles for the U. S. Army Engineer Corps are under contract They are used to transport crane-shovel attachments and are finished with an olive-drab paint.

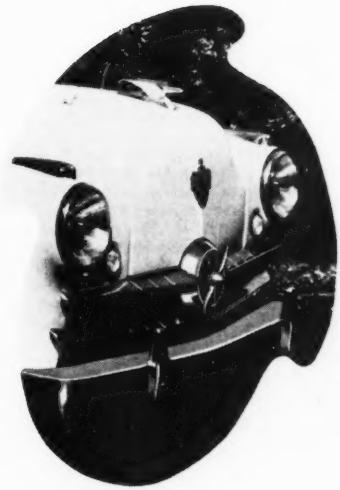
*(Photo courtesy The Trailmobile Co., Cincinnati 9, Ohio)*



The Kelvinator nine-cubic foot freezer features counterbalanced lid supports, removable steel wire baskets, flat table top, and push-button lock. It is finished in durable "Permalux," a urea-formaldehyde modified alkyd enamel, baked 30 minutes at 300 degrees Fahrenheit.

*(Photo courtesy Nash-Kelvinator Corp., Detroit, Mich.)*

# *that aid in appearance and utility*

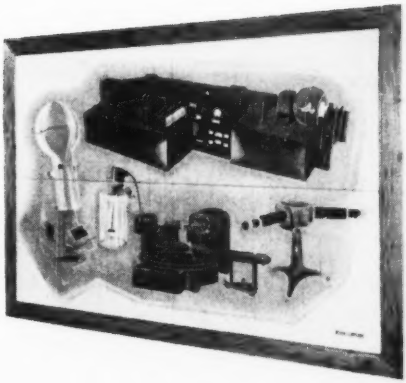


**The Lindberg Prop, a Finch chrome plated two-bladed propeller, was first introduced to the public in 1950, and is now featured as a standard decoration on the 1951 Crosley car models.**

***(Photo courtesy Lindberg Engineering Co., Chicago 12, Ill.)***

**This mural, portraying tools of research in porcelain enamel, is the work of H. Edward Winter. Made of four sections of 16 gauge enameling steel, the nine color designs were applied with templates and by hand. Each coat of porcelain enamel was fired separately.**

***(Photo courtesy Ferro Corp., Cleveland 5, Ohio)***



# NEWS of the Industry

## NEW PLANTS

**THE KIRK & BLUM MFG. COMPANY,** fabricator and erector of dust-collecting and fume removal systems, has announced completion of the primary phase of an extensive modernization of plant facilities.

From its start 44 years ago in a storeroom of the historic St. Charles Hotel Building at 232 E. Third Street, Cincinnati, Ohio, the company has figured prominently in the industrial development of the Queen City. Through its founders, the late Sylvester W. Kirk and the late Richard J. Blum, who organized the firm to meet "the urgent need for cleaner air in various industrial plants where manufacturing processes cause air pollution," the company expanded rapidly, as industries came to know the need for dust and fume removal systems.

As a corporation formed in 1923, the firm soon found need for more space. After several expansions, the company bought the plant and eight-acre tract of the former Cincinnati Planer Company in Cincinnati. In April of this year the concern concluded its seven-month moving plan into the new structure.

The plant, which can easily accommodate further enlargement, is a one-floor brick structure that contains approximately 120,000 square feet. Facilities in-

View of the interior of The Kirk & Blum Manufacturing Company

clude an exterior and interior rail siding, overhead crane handling systems throughout, and other features. Extensive modernization has been completed, and more is to follow.

## COMPANIES

A two-year, multi-million-dollar program of plant expansion at the Painesville, Ohio, plant of **DIAMOND ALKALI COMPANY** was announced recently by Raymond F. Evans, president.

The project embraces extensive enlargement and modernization of present facilities which will enable the company, producer of basic chemicals, to step-up output of caustic soda and chlorine substantially by the electrolytic method. It also includes construction of a plant for producing perchlorethylene, a chlorinated hydrocarbon solvent whose industrial applications have increased in recent years.

---

**ALMCO,** Albert Lea, Minn., manufacturer of Almco Supersheen barrel finishing equipment and materials, has announced the purchase of the R. F. Wuerfel Company, Detroit, former distributor for Almco Supersheen products in Ohio, Michigan, and Indiana. The purchase involves the Wuerfel building and equipment. No changes are contemplated in the Detroit personnel, and R. F. Wuerfel, former owner, will continue in the capacity of branch manager.

R. C. Trow, Almco general manager, stated that the Detroit branch will continue to handle sales, service, sample processing, and job processing for the three states previously served by the Wuerfel Company. Also, research and sample processing facilities are being expanded at this branch in order to provide a complete barrel finishing service to the manufacturers in the Detroit area.

---

**ENLEY PRODUCTS, INC.,** New York 38, N. Y., has announced the appointment of Davis-K Products Co., 54 W. 22nd St., New York 10, N. Y., as a distributor in the New York area.

Distributor for the West Coast is the L. H. Butcher Company of Los Angeles, San Francisco, Seattle, Salt Lake City, and Portland.

For the area of Albuquerque, New Mexico, Martin & Carlisle is now the distributor.

---

**AMERICAN-MARIETTA COMPANY** has announced the acquisition of **THE ARCO COMPANY** of Cleveland Ohio. This is in line with American-Marietta's successful policy of product diversification and specialization. Of particular interest is the prominent position which Arco occupies in the field of automotive refinishing materials.

The well-known Arco Color Mixing Machines and the Arco Color Bar date back to the pioneer days of the now modern and universally accepted methods of automobile color mixing and color matching. Arco is also noted for its research activities in connection with the proper application of other types of specialized

New Detroit branch of Almco

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*Saves You Money*
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THINNERS

We make nothing but Thinners—blended Solvents, and nothing else. Naturally, we buy large quantities of solvents—at lowest prices. *Specialization* saves us money on overhead too—and these savings we pass on to you, our customers.

We know how to formulate Thinners to your requirements—been doing it for 26 years. We've satisfied big and little customers . . . let us show you how a Lacquer Thinner *SPECIALIST* can supply you with the *right* Thinner . . . and still save you money.

Just fill out form below and mail today. We'll work out a Thinner *especially for you*, and send a sample. Think we can do it for 85¢ or less a gallon too!

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THINNER SPECIALISTS

The product we make is:_____
We use Lacquer Thinner for:
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We use Lacquer Thinner on:
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Name_____
Address_____
City_____ Zone____ State_____


finishing materials which it manufactures.

Kenneth E. Clarke, a vice president of American-Marietta, has been named president and general manager of Arco. Howard E. Wise, president of Arco since 1933, and Charles B. Lansing, vice president, will not continue with the company as they wish to devote their time to other interests. All other Arco personnel will be retained.

---

Plans for increasing the nation's alumina producing capacity by 180,000 tons annually, through the addition of new production facilities at an existing plant in Mobile, Alabama, were announced by Allen B. Williams, president of **ALUMINUM ORE COMPANY**, a subsidiary of Aluminum Company of America.

Alumina (aluminum oxide) is the material obtained from bauxite ore as the major preliminary step in the production of aluminum and of alumina chemical products. About two pounds of alumina are used in producing one pound of aluminum.

The Aluminum Ore Company is also currently erecting an alumina works at Bauxite, Arkansas, in addition to operating plants at Mobile and at East St. Louis, Illinois.

---

Establishment of a regional sales office and warehouse in Dallas, Texas, was announced recently by officials of the **MINNESOTA MINING & MANUFACTURING COMPANY.** The new facilities, designed to permit better service for 3M customers in Texas and neighboring states, are located at 1221 Dragon Street.

Officials in charge of the office and warehouse are Walter F. Gruetzman, office manager; Ray Paulson, sales manager for abrasives and related products; and Fred Richardson, sales manager for cellophane tapes.

---

The corporate name of **SOUTHERN ALKALI CORPORATION** was changed to **COLUMBIA-SOUTHERN CHEMICAL CORPORATION** effective September 1. A wholly-owned subsidiary of Pittsburgh Plate Glass Company, the firm is a producer of soda ash, chlorine, caustic soda and related chemicals.

Clarence M. Brown, chairman of the board of directors for both Pittsburgh Plate Glass Company and Columbia-

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**GRINDERS—BUFFERS—POLISHERS**
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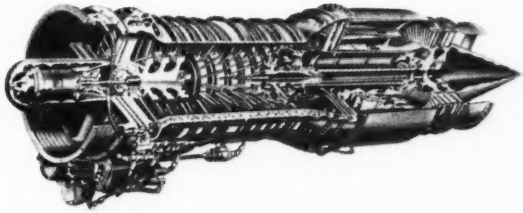

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USE STANDARD'S
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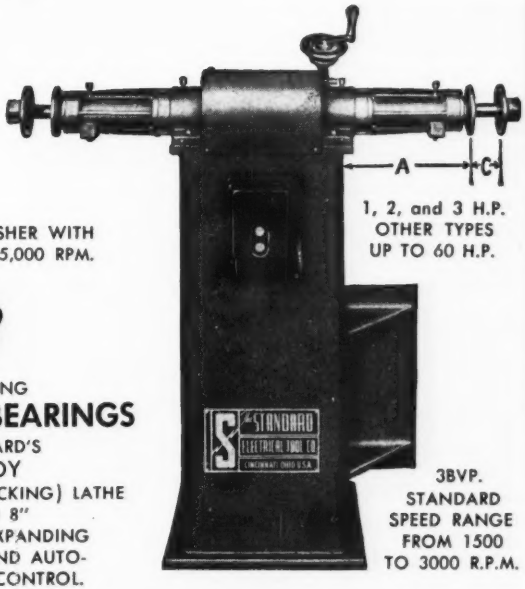


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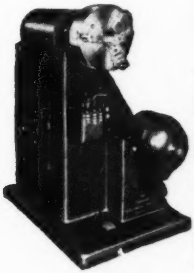
MERELY TURN THE →



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## the STANDARD electrical tool co.

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Southern Chemical Corporation, stated that the action involved a change in name only. Personnel, policies, and customer relations were not affected.

---

In commemorating its own 35th anniversary in the production of metal powders, the **METALS DISINTEGRATING COMPANY, INC.,** Elizabeth, N. J., has announced a plan to honor thirty-five of the oldest and foremost leaders in the metal powders industry. According to H. E. Hall, MD's president, the presentation of these honors will be the feature of a special dinner to be held in Detroit, during the National Metals Conference and Exposition.

Mr. Hall stated his feeling that with the present upsurge in the use of metal powders in increasing industrial applications, it seemed appropriate that due attention and consideration should be given at this time to those individuals in the metal powder industry who had labored long to bring about the present technological advances in powder metallurgy.

---

A test is being conducted to determine the performance of an experimental zinc plate and Iridite finishing system as an alternate to conventional chrome plating for automotive hardware and brightwork by **ALLIED RESEARCH PRODUCTS, INC.,** Baltimore, Maryland.

Parts under test include the front and rear bumper guards, gas tank flap, fender skirts, door handles, heater duct and others. These were specifically chosen to provide comparative results from both interior and exterior hardware and trim located at various points on the car. Some of the parts are steel base metal, while others are zinc die cast base metal. All are finished with zinc plate, Iridite, and either air dried or baked clear lacquer. Iridite is a chromate-type conversion coating manufactured by Allied Research, sponsors of the test. It provides corrosion protection and paint adherence to zinc, cadmium or aluminum surfaces.

The test car traveled a 10,000 mile route which covered the nation and passed through many types of weather and terrain, including industrial areas, dirt roads, alkali deserts and the East and West Coast salt atmospheres.

At the present status of this test the Iridite finished parts are in good condition compared to the chrome plated parts, thus far indicating the practicability of the new finishing system in terms of appearance and corrosion protection.

---

Plans to provide increased facilities for the manufacture of silicon carbide grain were announced recently by the **NORTON COMPANY.** Norton sells this silicon carbide grain under the trade name "Crystolon."

Basically, the plans call for a re-equipping of two of the present abrasive mills in the Worcester plant. By combining the crushing and milling units now housed in these two mills, Norton's processing of silicon carbide grain will be increased 30 per cent. The new unit will be known as Abrasive 7. Conversion work is now under way with full production in the re-equipped area expected late this year.

Charles C. Esty, Plants Engineering Department, is engineer in charge of the Abrasive 7 project.

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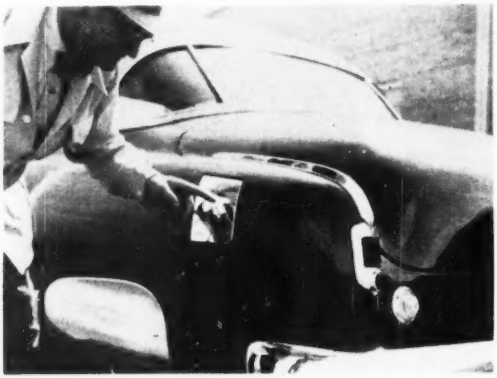


Inspecting the gas tank flap finished with an experimental zinc plate and Iridite system is H. C. Irvin, president of Allied Research Products Inc.

---

Edgar L. Newhouse, Jr., vice president of American Smelting and Refining Company and head of its **FEDERATED METALS DIVISION,** announces the establishment by Federated of a Midwestern department and the appointment of Carl J. Gross as its general manager.

# NATIONAL'S "Mity-Midget"

## FOR WORK OF ANY SIZE

Whether removing burrs on huge castings or putting a fine finish on relatively small surfaces, National's "Model 400" will do the job better and faster. Has a 3/16" orbital stroke . . . operates at 5000 to 6000 rpm . . . weighs only 4 lbs. . . . costs $79.50. Reliable . . . powerful . . . will not stall. Write for full details today or see your dealer.

MODEL 400

*Fast...Light...Powerful!*

NATIONAL AIR SANDER, INC.
2818 AUBURN ST., ROCKFORD, ILLINOIS

The Midwestern department comprises the States of North and South Dakota, Minnesota, Michigan, Wisconsin, Indiana, and parts of Illinois, Ohio, Iowa, and Kentucky. Federated has two producing plants in this territory at Whiting, Indiana, and Detroit, Michigan. Both will be under the direction of Mr. Gross who will continue as manager of the Whiting plant. Allan Nichamin, formerly Detroit sales manager, has been appointed manager of the Detroit plant to succeed Robert Ruch, resigned. Waldo C. Larson continues as superintendent at Detroit.

John W. Kelin, who has been appointed Midwestern sales manager, will direct the activities of Federated's entire Midwestern sales organization with headquarters at Whiting and district sales offices at Detroit under Mr. Nichamin, Cincinnati under Ben J. Lippert, Milwaukee under John L. Kammermeyer, and Minneapolis under Walter H. Schulte.

---

A laboratory for testing the pumping and spraying qualities of such materials as coatings, adhesives, sealers, and greases has been opened by **GRAY COMPANY, INC.**, at 2124 Fairmount Avenue, Philadelphia 30, Pennsylvania. The company, with plant and main office in Minneapolis, manufactures material-handling pumps, lubricating equipment, and other products. Another testing laboratory is maintained in Minneapolis, and a third will be opened in Atlanta in January 1952.

Purpose of the fully equipped laboratory is to furnish highly specialized data on pumpability and sprayability to manufacturers and users of fluids and semi-fluids, and to refiners of petroleum products. Companies located in the New England, Middle Atlantic, South Atlantic, and East South Central States are invited to submit samples for free testing.

Facilities of the laboratory are available to any company in these sections of the country desiring material tested to determine its pumping and spraying characteristics (or having a pumping problem). A description of the material, its use, and its present method of handling and application should be included; specification sheets or other descriptive literature would also be helpful.

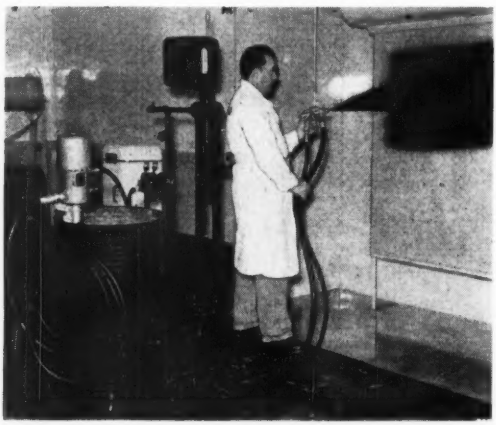
---

An expansion of **PITTSBURGH PLATE GLASS COMPANY'S** power-driven brush manufacturing facilities was started in September when ground was broken for a plant at Baltimore, Maryland. According to E. D. Peck, general manager of the firm's brush manufacturing division, the new plant will be a single-story structure measuring approximately 193 by 125 feet. Provisions for future expansion to a two-story structure have been incorporated in the original design.

A manufacturer of power-driven metal and fiber brushes since 1931, Pittsburgh Plate during the past 20 years has utilized space in its adjoining paint and varnish brush producing factory for this operation.

When completed, the plant will be equipped with new and improved machinery and the engineering, research and product development staffs expanded, according to Mr. Peck.

Design details for the new plant were made by Pittsburgh's paint division design specialists and the general construction contract has been awarded to Armiger Construction Corporation of Baltimore, Maryland.



View of Graco's Philadelphia Laboratory

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**GOVERNMENT SPECIFICATIONS**

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Aeronautical Material Specification AMS 2485

and all other specifications calling for a black oxide finish.

- Easily blackens heat treated parts.
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**QUALITY PRODUCTS OF CHEMICAL RESEARCH**

## HONORS

At its fourth annual summer symposium held June 14 to 16 in Washington, D. C., the Analytical Division of the American Chemical Society paid tribute to the **NATIONAL BUREAU OF STANDARDS** in honor of the 50th anniversary of the Bureau. At the dinner session the American Chemical Society presented an honor scroll to the Bureau in appreciation of the Bureau's work in chemistry and other fields of science and engineering. The presentation was made by N. H. Furman, president of ACS, to E. U. Condon, director of NBS. The scroll reads:

"The American Chemical Society extends its greetings, congratulations and best wishes for the future of the National Bureau of Standards on this 50th anniversary of its establishment and pays tribute to the contributions to chemistry which the Bureau has made in the standardization of materials and methods, in the development of new and improved products, and in basic research. These have been of major importance in this half century of rapid progress of the science, the industry, and the profession represented by this Society."

## NEW POSITIONS

The appointment of **DR. JAMES F. EVERSOLE** as manager of Research Administration of Union Carbide and Carbon Corporation has been announced by Dr. George O. Curme, Jr., vice president in charge of research. Dr. Eversole will help coordinate the research activities of all of the Corporation laboratories where basic research and development work is being done on alloys, chemicals, gases, carbons, and plastics.

Dr. Eversole joined the chemical research organization of the Corporation as a research chemist in 1929. Several years later he was assigned to the laboratories of Linde Air Products Company, a division of Union Carbide. In 1944, he was appointed superintendent of Linde's laboratories at Tonawanda, New York, a position he has held until his present appointment.

---

**FRANK H. BEADLES**, assistant regional sales manager at Chicago for the Du Pont Company's Finishes Division,

LANLY "BUILT-IN" Heating Systems
for Compact Streamlined Continuous Finishing Ovens
FIRST, Get a LANLY Proposal
Write for Catalog
THE LANLY CO.
OVENS FOR INDUSTRY
HEATED BY GAS, OIL, ELECTRICITY OR STEAM
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The trial and error method of discovering the appropriate finish for your product is costly . . . time consuming . . . often disappointing. Rather than pursue this method of developing a coating in your plant, get the scientific approach of our Creative Studio. A specialized service, such as ours, will bring you the economical, long-lasting, sales-appealing coating you've always wanted.

*Send a sample to be finished . . . no cost or obligation to reputable firms.*

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ROCKFORD, ILLINOIS
*Manufacturers of Protective and Decorative Coatings*

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GORDON BARTELS CO.
*Roller Coating Specialists*

has been appointed to the newly-created position of manager, Plants Technical Section of the division, the company has announced. Creation of the position is designed to further an intensified technical program in the eight plants of the Finishes Division and coordinate the activities of the plant laboratories.

Mr. Beadles, whose headquarters will be in Wilmington, has been assistant regional manager at Chicago since July 1950. A graduate of Virginia Polytechnic Institute in 1929, he joined Du Pont in the same year as a chemist in the Philadelphia finishes laboratory. He was at the Chicago finishes plant laboratory from 1935 to 1945, when he was named assistant manager of the Flint, Michigan, finishes plant. He was assistant manager of the Parlin, New Jersey, finishes plant from 1947 to 1950.

---

John B. Moore, manager of the Aviation-Industrial Chemicals Division of Fine Organics, Inc., New York, N. Y., has announced the appointment of the following sales representatives:

**PAUL R. BRANIFF,** for Texas and the South-Central area; **JAMES B. SCHOOLER,** for Kansas and the western Missouri area; **ROBERT M. MEYER,** president of Aviation Internation Corporation, for Miami, Florida; **A. J. BERNARD,** for Miami Beach, Florida; **GEORGE HESINGTON,** for south Jersey and eastern Pennsylvania; **GALE FORSSEN,** president of Industrial Cleaning Devices, Inc., for the New England States; and **ALBON T. WILSON** for New Jersey.

---

At a recent meeting of the board of directors, **JOHN GILBERT** was elected executive vice president of Ashdee Products, Inc., Homewood, Ill., manufacturer of "Paint-Miser" electronic paint-spray equipment.

In his new capacity, Mr. Gilbert will be in complete charge of all activities of the company.

John Gilbert

---

The Ferro Corp., Cleveland, Ohio, reports that a new member of its sales-service staff is **GRANT E. MILLER.**

A graduate in ceramic engineering from Ohio State University, Mr. Miller joined Ferro seven years ago as a research assistant, and in 1950 was promoted to supervisor of the company's Development Laboratory. He is a member of The American Ceramic Society, and is active in affairs of the Northern Ohio Division of the Society.

---

Election to new posts of several American Cyanamid Company executives was announced recently by Raymond C. Gaugler, president.

**E. D. POWERS,** vice president in charge of production, was elected to the board of directors. He succeeds **H. P. EASTMAN** who retired August 31.

**A. J. CAMPBELL,** general manager of the Industrial Chemicals Division, and **HOWARD HUSTON,** formerly assistant

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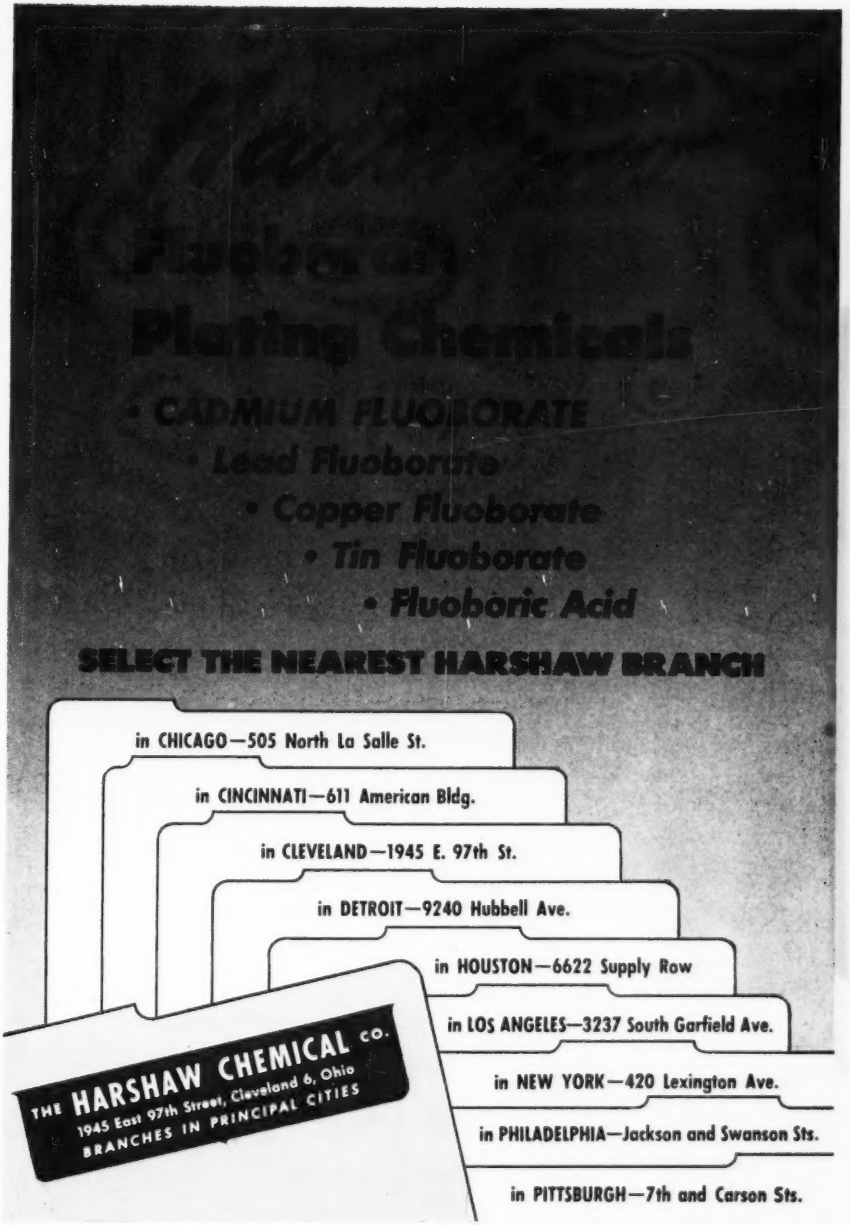
POLISHING?
HOLLAND SUGGESTS:
Motor Driven Tilting Tumbling Barrels for cleaning, polishing, grinding, deburring, sanding, burnishing and various other applications.
J. HOLLAND & SONS, INC.
MANUFACTURERS • DEALERS
276 SOUTH NINTH ST. • BROOKLYN, N.Y.


Plating Chemicals
• CADMIUM FLUOBORATE
• Lead Fluoborate
• Copper Fluoborate
• Tin Fluoborate
• Fluoboric Acid
SELECT THE NEAREST HARSHAW BRANCH
in CHICAGO—505 North La Salle St.
in CINCINNATI—611 American Bldg.
in CLEVELAND—1945 E. 97th St.
in DETROIT—9240 Hubbell Ave.
in HOUSTON—6622 Supply Row
in LOS ANGELES—3237 South Garfield Ave.
in NEW YORK—420 Lexington Ave.
in PHILADELPHIA—Jackson and Swanson Sts.
in PITTSBURGH—7th and Carson Sts.
THE HARSHAW CHEMICAL CO.
1945 East 97th Street, Cleveland 6, Ohio
BRANCHES IN PRINCIPAL CITIES

to the president, were elected vice presidents. **L. C. DUNCAN** was elected assistant to the president.

Other executive changes announced were the election of **J. J. MURRAY** and **G. C. WALKER** as assistant treasurers, and **J. W. KING** and **W. B. WARD** as assistant comptrollers.

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Joseph F. Janecke

**JOSEPH F. JANECKE** has been appointed manager of Ferro Corporation's New-Products Division. Until this appointment, he was Ferro's service manager.

A graduate engineer from Tri-State College, Angola, Indiana, Mr. Janecke is a specialist on problems of welding and design of porcelain enamel products. He joined Ferro in 1926.

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Robert B. Goodsell

**ROBERT B. GOODSELL** has been appointed sales and service representative for Enthone, Inc., of New Haven, Connecticut, in the Middle West. His address will be in care of Ardco, Inc., 6665 S. Nashville Ave., Chicago.

Mr. Goodsell has spent 24 years in the field of electroplating and metal finishing and is widely known for his activity in the American Electroplaters' Society.

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Dr. G. Klinkenstein, president of the Smith-Davis Co., Division of Maas & Waldstein Co., 10751 Venice Blvd., Los Angeles 34, Calif., has announced the addition of **BILL DeVALLE** to the company's sales force.

Assigned to cover a large section of the Los Angeles territory, Mr. DeValle has had many years of experience in the field of specialized production finishes.

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Dr. G. Klinkenstein, president of Maas & Waldstein Co., manufacturer of lacquers, enamels, and synthetic finishes, located in Newark, N. J., Chicago, and Los Angeles, has announced the addition of **SIDNEY G. MACY** to the company's sales force.

Sidney G. Macy

Assigned to cover a large section of the northern New Jersey area, Mr. Macy is experienced in the field of specialized production finishes, and has completed a training course in the company's Research and Development Laboratories and Pilot Plant.

---

The Cro-Plate Co., Inc., Hartford, Conn., has announced the election of **ALAN W. BROWN** as president to succeed **THEODORE L. BRANTLY, JR.**, who met his death in an automobile accident August 8, 1951. Simultaneously the company announced the election of **ROBERT C. ALLEN**, previously treasurer, as executive vice president and treasurer.

Mr. Brown is the co-founder of the Cro-Plate Company and as executive vice president has been in charge of manufacturing and engineering operations.

Mr. Allen joined the company as treasurer shortly after its founding.

---

Appointment of **JOSEPH L. TOLSON** as superintendent of the Keene Brush Division, Pittsburgh Plate Glass Co., Keene, N. H., has been announced. He succeeds C. A. Hill who died recently.

A graduate of the College of Commerce, University of Iowa, Mr. Tolson joined Pittsburgh Plate Glass Company during 1937 and has been associated with the firm's brush manufacturing operation during the past five years.

# KOCH OVENS

## OFFER YOU "FINISH INSURANCE"

***—Quality Finishes Insured By***

- **ACCURATE TEMPERATURE CONTROL**
- **PROPER AIR FLOW**
- **HEATING UNIFORMITY**

Three essentials that pay off in consistently fine finishes at low cost—all incorporated in KOCH Ovens. That's why KOCH Ovens are specified by leading industries . . . why you should contact KOCH on all your oven needs.

### New Oven Folder Ready

You should know about the complete line of KOCH standardized Ovens—a line backed by 76 years of metalworking experience. Get your copy now.

***Phone, Wire Or Write Today!***

**GEORGE KOCH SONS, INC.**

**EVANSVILLE, INDIANA**

**H. GORDON SMITH**, vice president and general manager of the textile division, has been named to the newly-created post of executive vice president of the U. S. Rubber Company. The position was created because H. E. Humphreys, Jr., has been called upon to act as president and chairman.

**WILLIAM E. CLARK**, assistant general manager of the textile division, has been elected a vice president and made general manager of the division.

## SOCIETIES

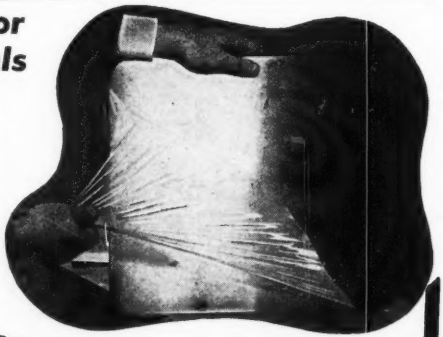
**BATTELLE INTERNATIONAL**, the international research institute to be established in Europe this fall by **BATTELLE MEMORIAL INSTITUTE**, Columbus, Ohio, the world's largest industrial research foundation, will maintain laboratories and offices in several Western European countries, it was announced. It will, in addition, place research investigations in existing research institutes of Europe and in European universities and technical schools.

According to Battelle Director Clyde Williams, a three-man team has returned to Europe to complete negotiations for laboratory sites and to recruit a European staff. The team also proposes to launch research projects in the laboratories of such organizations as the Fulmer Research Institute (England), TNO Council (Holland), and the Max Planck Gesellschaft (Germany).

Battelle International proposes to serve the European economy, on a non-profit basis, through science and technology. It will conduct research in the fields of applied chemistry and physics, metallurgy, fuels, ceramics, electronics, theoretical and applied mechanics, the engineering sciences, and agriculture.

An integral part of the Battelle program in Europe is the establishment of truly international laboratories to which scientists and engineers from all of the countries of Europe will be brought to work together. Battelle plans to dispatch teams of scientists from its American laboratories for limited periods of time. At the same time, scientists from the European laboratories will be brought to the United States to study techniques for industrial research here. Similar exchange arrangements will be offered to other laboratories and research institutes in Europe. In this way the common interests and objectives shared by scientists the world over will be encouraged, and friend-


**A Strippable Plastic for the Protection of Metals**



Striplastic is a protective plastic applied by spraying, dipping or rolling. It is used on stainless steels, high polished metal sheets, sheets in cold working or drawing, tools, dies and parts, and on sheets or metal parts before packaging. It protects against scratching and abrasion, and against rust. Also available as a booth coat protection.

THE STRIPLASTIC COMPANY
10828 QUEBEC AVE.
CLEVELAND 6, OHIO

Among many advantages, it is nontoxic, possesses great tensile strength and is easily stripped off in one piece. Write for complete information on this new strippable plastic.

# STOP WORRYING about Down Time

*Switch* to **PLATECOIL** for
(REPLACES PIPE COIL)

## TROUBLE-FREE Tank Heating and Cooling

Platecoils have many times the useful life of pipe coils thus preventing many production delays. When repairs are necessary, plates are changed from outside the tank in a matter of minutes without dumping tank solution. You can save STEEL, MAN-HOURS and MONEY by using Platecoils and you will enjoy TROUBLE-FREE heating and cooling.

NEW Technical Manual No. P50 simplifies the solution of heat transfer problems. Send for your copy today.

PLATECOIL
Division
KOLD-HOLD MFG. CO.
LANSING 4, MICHIGAN

### Why Platecoils Cost Less

**LOW FIRST COST**

The initial cost of Platecoil is often 50% or more below the cost of equivalent pipe coil depending, of course, on the materials used in construction.

**EASY INSTALLATION**

By the use of "quick change hangers" Platecoil installations can be made in open tanks in one-half hour or less by one man and a helper.

**NO THREADED JOINTS IN TANK**

The entire Platecoil is electric welded and pressure tested. There are no joints to corrode or leak. Both connections to the Platecoil can be located above the liquid level where there is no danger of thread corroding and freezing.

**GREATER TANK CAPACITY**

A 22" x 47" Platecoil gives the same heat transfer surface as 32 feet of 1½" pipe. This pipe requires a space approximately 30" x 60". Platecoil thus saves about 50% over equivalent pipe coil.

**WEIGHS 50% LESS**

Weighing only about half as much as equivalent pipe coil, Platecoil is easy to handle. A whole maintenance crew is not needed to transport and install Pipecoil.

**TANK MAINTENANCE WITHOUT LOSS OF SOLUTION**

There is no need for workmen to get inside the tank in order to make replacements or repairs. A Platecoil can be removed in a matter of minutes with the solution still in the tank.

**LITERATURE**

The new Platecoil Bulletin furnishes a complete description of the Platecoil method of tank heating. Write for your copy today.

**HIGH BTU TRANSFER**

More prime surface of Platecoil can be installed in a given area than can be obtained with pipe coil. Thus a more compact Platecoil unit provides much greater BTU transfer per unit area than can be obtained with pipe coil. Quick starts in heating tank solutions mean more hours of productive time.

**Kold-Hold Manufacturing Company, Lansing 4, Michigan**

ship and understanding will be promoted among men of many nations.

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The first fall meeting of the **INDIANAPOLIS BRANCH, AMERICAN ELECTROPLATERS' SOCIETY,** was held at Fox Steak House, 1207 E. Washington St. The usual steak dinner was served to 25 members with 33 present for the meeting at 8:00 P.M. A. Kriese, president, introduced W. Binia who was the first president and organizer of the reorganization of the Branch. He spoke a few words regarding this reorganization. E. Lundberg, librarian, introduced the speaker of the evening, Robert Kryter, treasurer of the Esterline-Angus Co. Mr. Kryter is a nationally known expert on atomic energy and spoke on "The Present Version of The Atomic Story."

After he reviewed the history and origin of atomic energy, Mr. Kryter related that the three atomic energy plants, Clinton Engineering, Oak Ridge, Tenn., Hanford Engineering, Hanford, Wash., and Los Alamos, New Mexico, are already out of date because of the recent developments of atomic energy. The speaker also reviewed the new Hydrogen Bomb and the possible destruction of this bomb. Although his talk was of desolation and destruction there is some bright future of atomic energy in the field of surgery and treatment of various illnesses, also in the field of industry. All business of the branch was postponed until next meeting with the exception of the election of three new members: Bert Servass, Paul Simmons and R. Branigan.

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Following a mass meeting on August 21, the **CHICAGO ELECTRO-PLATERS INSTITUTE** announced it would pay a reward of $2,500 for information leading to the arrest and conviction of a gang responsible for a series of Chicago electroplating shop burglaries in which scarce materials, principally nickel, have been stolen.

The loot in 30 burglaries reported to the Chicago Electro-Platers Institute since last October is valued at $50,000 at the normal market prices under the federal allocation program. In the open or "grey" market, the stolen metals would probably bring around $250,000.

The loot in the 30 burglaries included 40,000 pounds of nickel, 3,000 pounds of cadmium, 3,000 pounds of lead, 400 pounds of copper, and 500 pounds of brass.

---

The **AMERICAN ELECTROPLATERS' SOCIETY** has appointed Glassner & Associates, Public Relations, Chicago, to manage and promote the Society-sponsored **Industrial Finishing Exposition** scheduled for June 16-20, 1952, at the In-

Members of the Chicago Electro-Platers' Institute who held a mass meeting to plan attack on nickel thieves.

# DU-LITE'S 5 POINT GUARANTEE of Superior Black Finishing

✓ 1 MAKE A THOROUGH STUDY OF YOUR BLACK FINISHING REQUIREMENTS

✓ 2 FURNISH AND INSTALL THE CORRECT EQUIPMENT AND FACILITIES

✓ 3 TRAIN YOUR EMPLOYEES IN DU-LITE'S EASY TO OPERATE, TROUBLE-FREE PROCESS

✓ 4 SUPPLY HIGHEST QUALITY CHEMICAL PRODUCTS THAT ARE PRODUCTION TESTED

✓ 5 BE CONTINUALLY READY TO ASSIST YOU WITH ALL YOUR BLACK FINISHING PROBLEMS THROUGH TECHNICAL MEN LOCATED NEAR YOU

## * DU-LITE BLACK FINISHES FOR STEEL, STAINLESS STEEL, MALLEABLE IRON CASTINGS, COPPER AND ZINC

Du-Lite's NEW Oxide Blackening Process for stainless steel and malleable iron is easily and uniformly operated at low temperature, producing consistent results economically. Du-Lite Black Finishes are widely accepted throughout industry for their protection, beauty, and ease of application. Also used by leading aircraft engine manufacturers as an aid to lubrication of bearings during "break-in" to prevent scoring. Write for technical data, or send samples for processing.

** Du-Lite Meets U. S. Govt. Specifications for Type III Class A Black Oxide Finish.*

***DU-LITE METAL FINISHING CHEMICALS AND PROCESSES**

THE DU-LITE CHEMICAL CORP.
100 RIVER ROAD, MIDDLETOWN, CONN.

Please send me technical data about the finishes I have listed below.

*Name* _____

*Address* _____

*City* _____ *State* _____

ternational Amphitheatre, Chicago. The exposition is being held in conjunction with the organization's 39th Annual Convention at the Stevens Hotel. Previous Expositions have been sponsored by the Society in Detroit and Atlantic City. Along with manufacturers of plating equipment and supplies, plating instruments, and paint and allied equipment, companies in related and service fields such as abrasives, masking tapes, chemicals, polishing and buffing, safety devices, materials handling apparatus, and so forth, are invited to exhibit. Inquiries should be addressed to the Industrial Finishing Exposition, Suite 1268-78, 35 East Wacker Drive, Chicago 1, Illinois.

## MEETINGS

Announcement has been made by G. H. Wescott, Meetings Chairman of the **FEDERATION OF PAINT AND VARNISH PRODUCTION CLUBS**, that the annual banquet to be held on Friday evening, November 2, during the Atlantic City Meeting will be a joint men's and ladies' affair. This innovation is in response to popular demand and eliminates the duplicity of arrangements necessary when separate banquets are held.

An enjoyable menu is planned and talent has been booked for an excellent entertainment period following the banquet.


Park No. 290
BLACKENING SALT

Black Oxide finishing for rust resistance and decorative parts. Speedy black coating in water solution with no electric current. Permanent black finish on ordnance parts, tools, aircraft, bearing races. Dazzling black decorative finish for television cameras, business machines, hardware, metal screens and machine parts. Excellent bond for paints and enamels. Simple one bath operation. Write for bulletin H-16. Park Chemical Co., 8074 Military Ave., Detroit 4, Mich.


## meetings OF INTEREST TO FINISHERS

**Oct. 15-19. 33rd Annual Metal Show and National Metal Congress,** Detroit, Michigan.

**Oct. 18-20. South Central Regional Meeting, National Association of Corrosion Engineers,** Corpus Christi, Texas.

**Oct. 23-25. 54th Annual Convention, International Association of Electrotypers & Stereotypers,** Hotel Kenmore, Boston, Massachusetts.

**Oct. 29-31. 63rd Annual Convention, National Paint, Varnish and Lacquer Association,** Chalfonte-Haddon Hall, Atlantic City, New Jersey.

**Oct. 31-Nov. 2. Annual Meeting, Porcelain Enamel Institute,** The Greenbrier, White Sulphur Springs, West Virginia.

**Nov. 1-3. 29th Annual Meeting, Federation of Paint and Varnish Production Clubs,** Chalfonte-Haddon Hall, Atlantic City, New Jersey.

**Nov. 26-Dec. 1. 23rd Exposition of Chemical Industries,** Grand Central Palace, New York, New York.


YOU Get MAXIMUM Throwing Power When You Specify . . .

HEIL LEAD ANODES
- Sawtooth
- Herringbone
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HEIL Process Equip. Corp.
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...exhausting corrosive fumes a problem?
● It's no longer a problem here! Corrosive fumes from these anodizing tanks formerly made replacement of the stainless steel exhaust system necessary every six months. This ARCO rubber lined system is still on the job and going strong after 2½ years.
Our engineers are specialists in rubber processing all types of production equipment used in the handling of corrosives. Why not let us help you solve your difficult problems?
EXHAUST SYSTEMS • UTENSILS
OPEN AND CLOSED TANKS • PIPE
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ANYTHING CAN BE COVERED WITH RUBBER
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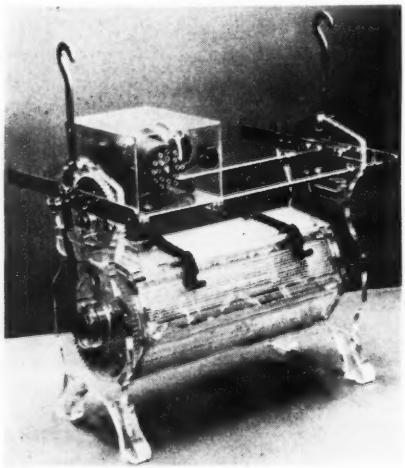
ENGINEERS AND MANUFACTURERS

# New • EQUIPMENT • MATERIALS • PROCESSES

## Portable Plating Barrel with Plexiglas Cylinder

Development of the Hanson-Van Winkle-Munning Co., Matawan, N. J., is the Mercil portable type plating apparatus with Plexiglas cylinder. This equipment, which is made with cylinders 6 inches in diameter by 12 inches long O.D. and 8 inches in diameter by 18 inches long, will enable the user to process small parts efficiently.

The entire unit is light in weight and can be easily handled. A rheostat is included so that the cylinder can be operated at various speeds. Cylinder, legs, and gears are of Plexiglas; the motor is 1/15 h.p., suitable for operation on 110 or 220-volt, single-phase, 60-cycle power circuit. It can be used in either acid or alkaline solutions, providing the temperature of the bath does not exceed 180-185 deg. Fahrenheit.



H-VW-M Portable Plating Barrel with Plexiglas Cylinder

## Phosphate Treatment for Metals

Hit-and-miss finishing techniques are claimed to become a thing of the past with the use of Anchorite 100, a phosphate compound for treating metallic parts, produced by Octagon Process, Inc., 15 Bank St., Staten Island 1, N. Y. Anchorite 100 gives uniform results and meets the specification for a Class C (Type II) finish in U. S. Army Specification No. 57-0-2C. It also meets the armed services Specification JAN-C-490, Grade 1, and is used on military equipment on which paint failure cannot be risked.

According to the manufacturer, the phosphatizing action of Anchorite 100 changes the surface of steel, iron, zinc, and cadmium parts into an inert, phosphate compound which is highly resistant to corrosion, and which provides an excellent base for organic coatings.

Application of the phosphate treatment to metal parts is simple, requiring no elaborate equipment. Applicable by either immersion or spray, it is easily adapted to both small and large production needs. The process utilizes a series of five tanks constructed of mild steel. Zinc and cad-

mium require only 30 seconds to one minute in this process, while some steel alloys occasionally require as much as 5 minutes. The Anchorite solution is made by adding a small quantity of Anchorite 100 to a large volume of water.

By using the treatment, corrosion due to accidental scratching or chipping is said to be eliminated. Phosphate surfaces produced by the treatment limit paint failure to the exposed area and prevent its spreading under the paint film.

Although Anchorite 100 is used mainly on ferrous parts, it is also finding wide acceptance as a pre-heating treatment on such metals as zinc, galvanized iron, and cadmium. The company states that an Anchorite 100 treatment provides these metals with a paint-adherent, corrosion-resistant phosphate surface. It also produces a corrosion-resistant film which gives long-lasting protection even if an organic coating is not applied over it.

## Featherweight Spray Gun

A featherweight spray gun remarkable for increased versatility has been introduced by the DeVilbiss Co., 300 Phillips Ave., Toledo 1, Ohio. Identified as a Type TGA Spray Gun, it is designed for a wide range of spray work requiring top finishing quality from touch-up of small spots to the refinishing of large objects. A fingertip adjustment control quickly provides a wide selection of spray patterns for various types of jobs and paint materials.

DeVilbiss engineers specified an aluminum alloy in the box-frame-designed gun body for ruggedness and dependability. The gun, weighing 13¾ ounces, is finely balanced and has a sure-grip handle designed to reduce hand fatigue while spraying. Trigger action is smooth.

According to the manufacturer, the spray gun is a precision instrument with the patented ball and cone principle of nozzle construction. A specially designed air baffle distributes air equally for uniform, thorough, and extra fine atomization. For efficient operation, the gun requires about 4 or 5 cubic feet of air per minute at 40 pounds pressure.

The TGA Spray Gun is designed for either suction or pressure feed, the two types of feeds enabling a workman to spray all kinds of materials.

Maintenance of the gun is simple, it is stated. The brightly polished finish is easily wiped clean, and the short paint passage in the gun can readily be flushed out with paint thinner.

## "Duro-Joint"

The Electro Chemical Engineering & Mfg. Co., 750 Broad St., Emmaus, Pa., has announced the development of a wrapped joint for Haveg and other resin-base pipe known as the "Duro-Joint." Composed of a spiral wrapping of glass cloth and Lecite acid and alkali-proof furan resin cement using a special technique, it is equal in strength and chemical resistance to the pipe itself. The Duro-Joint replaces, in many instances, the flange-type joint which is subject to corrosion, and also may be used to repair broken pipe or to armor porcelain or stoneware.

According to the manufacturer, the Duro-Joint can be made in the field without the use of heat or special equipment. Duro-Joints were tested without failure under hydrostatic pressure pulsating rapidly from 0 to 350 p.s.i. The joints were then placed under 100 pounds steam pressure, and while hot, the pressure was released and the joints immersed at once in water at 60 deg. F. The joints were claimed to be unaffected by this shock

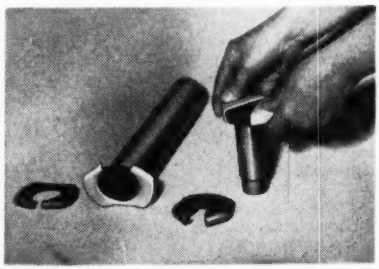
DeVilbiss Featherweight Spray Gun

treatment. While under 350 p.s.i. pressure, the joints were subjected to repeated blows of 8-foot pounds. At the conclusion of these tests, Duro-Joints showed no leakage or damage.

## Flame-Sprayed Stop-Offs for Plating

A new and very economical method of masking portions of metal articles to be plated has been developed by the American Agile Corporation, Plastics Division, 5806 Hough Ave., Cleveland 3, Ohio.

Instead of covering the sections which are not to be plated by the conventional methods such as lacquering or tape masking, a completely non-porous and chemical inert coating of polyethylene (about $\frac{1}{16}$ to $\frac{3}{32}$-inch thick) is flame-sprayed onto the section to be masked. To allow the initial removal of the stop-off mask for re-application to subsequent parts, the section to be masked is covered with a thin coating of a special mold release agent prior to spraying.

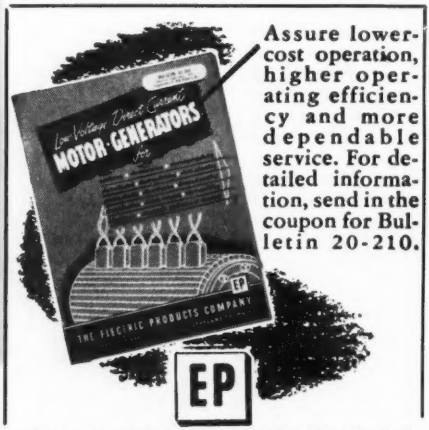


Flame Sprayed Stop-Offs

Due to the inherent elasticity and chemical inertness of polyethylene, these stop-offs can be removed from the plated parts and then replaced onto those to be plated a great number of times by simply snapping them off and on the part to be plated as shown in the photograph.

It is claimed that Flame-Sprayed Polyethylene Stop-Offs result in great labor and material savings to the plater by eliminating the tedious and time-consuming operation of masking and unmasking each individual part.

The flame spray equipment for making stop-offs by the individual plater as well as polyethylene plating stop-offs made to customer's specifications are offered by the corporation.


Assure lower-cost operation, higher operating efficiency and more dependable service. For detailed information, send in the coupon for Bulletin 20-210.

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TITLE_____

COMPANY_____

STREET_____

CITY_____ ZONE____ STATE_____

X-73


## Protective Coating-Liner

Available from the Finishes Division of Interchemical Corp., 224 McWhorter St., Newark 1, N. J., is an Epoxy resin protective coating-liner called "Synthetasine 100" which, through mechanical and chemical resistance, broadens the field of products to be successfully shipped in lined steel containers.

According to Synthetasine Protective Coatings, Inc., New York, licensor of the

product, Synthetasine 100 is a direct result of the requirement demands of manufacturing chemists. Developed by Battelle Memorial Institute scientists, studies show the coating-liner resistant to the following types of products: alkali, dilute mineral acids, chlorinated solvents, formaldehyde (36-38 per cent aqueous), detergents, detergents combined with hydorcarbon solvent, fatty acid, and emulsions.

Synthetasine 100 combines exceptional flexibility and excellent resistance to normal abuse in shipping and moving lined containers, not shattering easily like pure phenolic. It is not cracked or chipped by a 60-inch-pound blow struck on a ¾-inch-diameter rounded tip contact with the back (uncoated side) of a 22-gauge cold-rolled steel sheet, it is claimed.

## Quik-Masks

To meet the need for a fast method of masking products during various stages of production, the W. H. Brady Co., Dept. 308, 1602 E. Spring St., Chippewa Falls, Wis., has announced its Quik-Masks, handy self-adhesive, pre-cut masks and gaskets which are quickly applied without moistening to the areas requiring protection. They eliminate cutting out masks by hand, metal masks, tedious hand outlining, and so on.

Claimed to be ideal for masking name plates, dials, gages, machined parts, holes, threads, engraved and embossed letters, plated and polished sections or any shaped surface. Quik-Masks provide positive protection during spray painting, cleaning, plating, machining, tumbling, sandblasting, buffing, polishing, and many other production operations.

Brady Quik-Masks are made from "Scotch" Brand pressure-sensitive masking tapes and come pre-cut to the exact size and shape required. They are either mounted on cards, several masks to a card, or individually with each mask having its own folded liner on the adhesive side.

## Heat-Resistant Paint

Speco, Inc., 7308 Associate Ave., Cleveland 9, Ohio, has available its Type M Aluminum Heat-Resistant Paint. Suitable for both interior and exterior use by brush or spray application, it resists moderately high temperatures (200 to 700-deg. F. range), fumes, moisture, mild alkalies and acids.

According to Speco, the paint will set in three hours and dry in 18 hours. Normal coverage is 550 square feet per gallon, and it can be obtained in 1, 5, and 55-gallon cans and drums.

## Enamelstrip

Metal coils, pre-coated in color and precision slit to exact width, are facilitating production and reducing manufacturing costs in a number of industries. The product, trademarked under the name "Enamelstrip", is produced exclusively by the Enamelstrip Corporation, 20th and Walnut Streets, Allentown, Pennsylvania.

Enamelstrip is remarkable in its versatility and adaptability to any number of industrial uses. The coil is available in cold rolled steel, electro-galvanized steel and electrolytic tin plate, brass, zinc and aluminum in any desired color or shade, coating on one or two sides. The exclusive Enamelstrip process which binds the adhesive coating to the metal enables the coil to withstand the stresses of drawing, bending, forming and fabri-

Enamelstrip as applied to items such as batteries, marking devices, automobile parts and appliances.

cating without cracking or peeling.

The flexibility and adhesion of the chemically treated enamel coating provides unusual advantages in practically every type of stamping, molding and drawing operation by eliminating the need for many costly steps normally required for enameling or painting after the metal is formed. With "Enamelstrip" cleaning, tumbling, spraying, dipping, rustproofing, baking and drying are all unnecessary, it is stated.

Other advantages, which are claimed, when Enamelstrip is used are: (1) elimination from the production schedule of such processes as finishing, shearing and hand feeding; (2) elimination of all waste; (3) saving of space usually allocated for storing the metal. In addition to the economies of mass production and continuous fast coil feed, from a strip of the exact size required, the appearance of the finished item is a distinct asset. Because of its flexibility and strong baked surface, Enamelstrip maintains its smooth, lustrous finish throughout the manufacturing process, it is stated. It is being successfully used for such items as batteries, appliances, automobile parts and accessories, containers and screw caps, office equipment, marking devices, buttons and buckles, toys, lighting fixtures, instrument parts, novelties and a host of others.

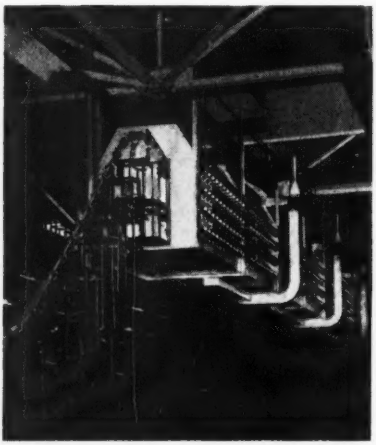
The Enamelstrip Corporation will supply its own metal coated and slit, or will coat and slit a customer's metal according to individual specifications. Samples of Enamelstrip will be sent on request to the company's exclusive sales representative, The Coated Coil Corp., 501-551 West 30th Street, New York.

## Lea Copper-Glo

The Lea Manufacturing Co., Waterbury, Conn. has announced the availability of Lea Copper-Glo for the Ronal Bright Copper Process.

According to the manufacturer, this process makes it possible to obtain certain desirable finishes without the need of nickel plating as an intermediate step. Lea Copper-Glo also makes it practicable to plate pre-finished steel and die-castings directly with chromium (over the bright copper) without any intermediate buffing operation.

The Ronal High Speed Bright Copper Plating Process using Lea Copper-Glo is an improved method for depositing a mirror-bright copper even at high current densities and at 100 per cent efficiency

A conveyorized TRIANGLE INFRARED OVEN in operation in a large telecommunication plant. The Tipp Cable-Way Conveyor is designed to carry loads from 10 to 450 lbs. per trolley. Catalogs on request.

**A TRIANGLE INFRARED OVEN WILL**

**BAKE • DRY • PREHEAT**

**your product FASTER, SAFER, AND MORE ECONOMICALLY with consistently uniform results—regardless of weather or production requirements.**

Made of standardized, prefabricated parts, a TRIANGLE INFRARED OVEN can be made to supplement or complement your present heating equipment, or it can be easily altered to meet new conditions.

Whether your plans call for a simple bank of lamps, a batch oven or a conveyorized oven with complete ventilation—it will pay you to contact the pioneer in the industry.

*Our laboratory is at your service—no obligation, of course!*

**TRIANGLE EQUIPMENT CO., INC.**

*Designers, Engineers, Manufacturers*

**45 RIVER ROAD NUTLEY, NEW JERSEY**

# *Start* Clean... *Stay* Clean!

He worked too hard cleaning that mirror to let a flock of flies get gay with it! And the smart plater won't risk wasting all the time, labor, and money involved in preparing work for plating by putting the metal into a bath of questionable purity.

*Start* clean . . . *stay* clean! Red Label Darco S-51 adsorbs the impurities that cause trouble in plating baths . . . takes them out of the bath before they can be deposited on the freshly cleaned surface of your work.

Red Label Darco helps you save on scarce anode metals . . . helps you do a better job with thinner deposits . . . minimizes rejects.

Red Label Darco S-51 is especially treated for use in plating—the only activated carbon that meets the benzol-mercury test! It is especially easy to handle . . . easy to wet . . . easy to make into a slurry. Place your order for Red Label Darco today. Don't accept substitutes!—practically all suppliers carry Darco in stock.

**With clean metal... keep the Bath Clean**

## DARCO DEPARTMENT

**ATLAS POWDER COMPANY**

Darco General Sales Offices

**60 East 42nd Street, New York 17, N. Y.**

with exceptional throwing power. Deposits obtained from this bath are said to be comparable to bright nickel in brightness and are thus an ideal coating for zinc die-castings prior to nickel, brass or chromium plating. The deposit is ductile and bright for all thicknesses of plate, and has excellent adhesion to the base metal. On steel, where it may be desired to flow the deposited copper to remove or hide scratches or polishing marks, the Ronal Bright Copper is claimed to be an ideal coating.

The Ronal Bright Copper Solution will deposit mirror bright deposits at a current density range of 10 to 60 amperes per square foot with standard cathode rod agitation. Operating temperature range is broad, from 140 to 160 deg. F. Lea Copper-Glo is stable, no breakdown of the brightener occuring even if the plating solution should stand idle for prolonged periods.

## Portable Infra-Red Oven

A portable caster base infra-red oven, having variable lamp spacing and adjustable-at-any-time construction, has been announced by the Wil-Son Manufacturing Co., Dept. PF, Cloverport, Kentucky.

NALCO
Infra-Red UNITS

Speed Industrial Drying, Baking and Heating

Engineered for production use, Nalco Infra-Red Lamps with long-lasting carbon filaments give less glare, more penetrating heat . . . assure completed jobs at a faster rate—and at a much lower cost
From single units, strips and portable units to banks and ovens, Nalco Infra-Red Lamps and units can be "tailored" to speed up *your* production.

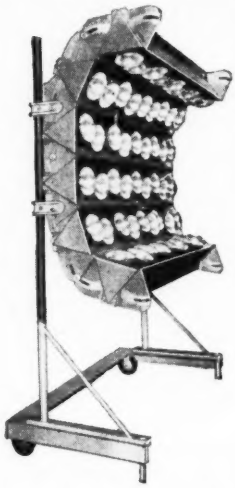
*Write for "Drying Problems Made Easy"*

NALCO INFRA-RED DRITHERM

NORTH AMERICAN *Electric Lamp Co.*

1020 TYLER ST. - - ST. LOUIS 6, MO.


The variable lamp spacing entails the principle of providing fewer lamps in the upper part of the oven and more



Portable Caster Base Infra-Red Oven

lamps in the lower part. After extensive laboratory tests it has been proved that this method will produce more even heat, due to the fact that the hot air in the oven rises in a vertical bank of lamps.

The oven has asbestos insulation for maximum heat conservation, and the adjustable construction permits the user to make changes in oven shape, even after the equipment is in actual operation. Available in 32 and 48-inch lengths, with any number of 8½-inch wide lamp rows, the ovens may be used side by side to provide a continuous oven.

## TI-LOC Protective Coating

The Strong Manufacturing Co., Sebring, Ohio, manufacturer and processor of porcelain enameled steel products, has announced the development of "TI-LOC," a one-coat, white titanium vitreous enamel direct-to-steel protective coating. Outstanding advantage of this process is the fact that no premium steel is required.

Proved in production on a number of products, the company states that completely satisfactory coatings have been achieved at thicknesses as low as three thousandths of an inch.

# SAVE ON WHEELS . . . STEP UP PRODUCTION

Speeds from 1,500 to 3,000 RPM are instantly available with the turn of the dial while the lathe is in operation. Polishing and buffing (cut-color-satin) can be done on one machine with no delays or lost motion.

The Hammond VRO Variable Speed Polishing Lathe definitely will step up production and improve finish. Maximum wheel economy is assured, too, because efficient peripheral speed can be maintained at all times — wheels can be used right down to the flanges before discarding.

Hammond

## VRO

### VARIABLE SPEED

## POLISHING AND BUFFING LATHE

the DIAL does it

**WRITE FOR CATALOG**
Catalog showing all Hammond polishing lathes, abrasive belt, "OD" and automatic finishing machinery gladly sent on request. Write today!

Hammond of KALAMAZOO
GOOD MACHINERY SINCE '82

Hammond Machinery Builders INC.

1622 DOUGLAS AVENUE • KALAMAZOO 54, MICHIGAN

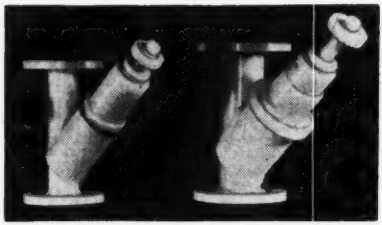
For more complete information on products and processes use READER SERVICE CARDS inside covers.

TI-LOC, according to the manufacturer, possesses all the attributes common to standard vitreous enamel cover coats over ground coats, such as permanence of color, acid resistance, and scratch-proof and burn-proof characteristics. In addition, its improved adherence and thinness of coating incorporate a ruggedness which provide extreme impact resistance and flexibility. One of the very unusual features claimed for TI-LOC is that it may be drilled, punched, sheared, and sawed in its finished state.

## Agilene Polyethylene Valves

American Agile Corp., Plastics Div., 5806 Hough Ave., Cleveland 3, Ohio, is offering 1 and 2-inch bore valves which are fabricated throughout from polyethylene, except for the packing rings which are made from a polyethylene-polysobutylene mixture.

Extremely light in weight (1 pound and 3¼ pounds), Agilene Polyethylene Valves are claimed to be highly resistant to most corrosive chemicals, including hydrofluoric, sulfuric, nitric, and hydrochloric acids at temperatures up to 170 deg. F. They are furnished with standard drilled flanges for easy incorporation into existing installations or for use in new pipe line assemblies.



Agilene Polyethylene Valves

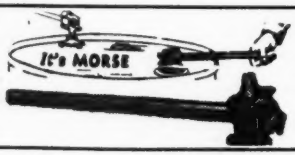
SOLVENTS RECOVERED BY
THE LOFGREN PROCESS
We RECOVER YOUR
SOLVENTS and THINNERS
From - Wash Thinners, Spoiled Lacquers, Degreasing Machine Sludge, Etc.
Each customer's shipment, whether one drum or a carload, receives proper and separate treatment. Write to:
SOLVENTS RECOVERY SERVICE, INC.
101 Central Ave. or Westfield, N. J.
HAMMOND SOLVENTS RECOVERY SERVICE
241 Brunswick St. Hammond, Ind.

## PRODUCT LITERATURE

**"Barrel Finishing with Alundum Tumbling Abrasive"** is the title of a booklet prepared by the Norton Co., Worcester 6, Mass. The pocket-size booklet of 56 pages is liberally illustrated with photographs and drawings. Written for fast and easy reading, it is divided into three sections. The first section covers the topics of grit sizes, features of Alundum tumbling abrasive, barrel finishing factors, equipment cleaners and rust preventives; the second section's topics are barrel finishing procedure, roughing, finishing, processing of samples, separation of work from abrasive, washing, drying, rescreening of abrasive, and mixing different parts. Included in this section are some typical examples of barrel finishing jobs; the type of barrel, the abrasive, the water and cleaner, and the barrel speeds being given.

The last section of the booklet is devoted to practical hints for the operator and shows a layout for a typical barrel finishing room.

Send NOW for this FIT-ALL
DRUM PLUG WRENCH
Instantly loosens, tightens 95% all plugs or bungs in steel drums. Has 16" extra-strong steel tubing handle. Wgt. only 2 lbs. Order 1 or more today!

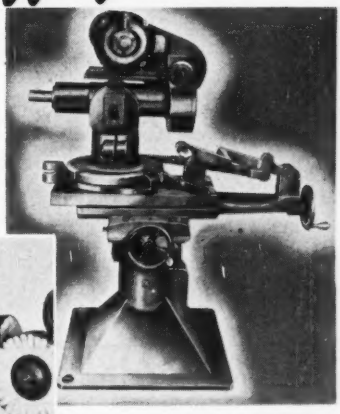


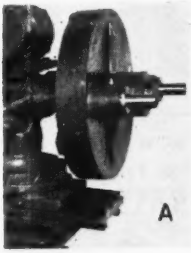

THOUSANDS IN USE saving time, labor, accidents!
SATISFACTION GUARANTEED.... $3.00
Non-sparking type ....$4.60
Plus Parcel Post
MORSE MFG. CO., Inc.
125 Dickerson, Syracuse 2, N.Y.

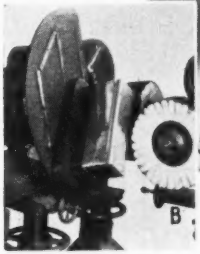
# ACME *Automatic Polishing and Buffing Machines*

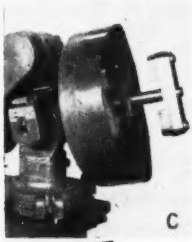
## The ACME Type B-10 Semi-Automatic

This machine gives very efficient production. One operator normally operates two or more units, one at each end of lathe, loading and unloading one while the other has work in contact with wheel.






(A) Equipped with A-2 head handling parts up to 12" diameter.

(B) Equipped with Acme patented Geared Chuck; keeps rectangular or other out-of-round work in constant uniform wheel contact.

(C) Geared chuck for polishing or buffing faucet bodies. Production up to 240 pieces per hour.

This single spindle machine is used with the conventional lathe for finishing cylindrical parts. Toggle slide, vertical and cross slide adjustments permit quick set ups when changing jobs. Additional accessory equipment can be furnished for finishing a large variety of out of round parts as well as cylindrical work.

***Catalogs on request***

ROTARY STRAIGHT LINE SEMI-AUTOMATIC AND SPECIAL *Polishing and Buffing Machinery*

**ACME** *Manufacturing Co.*

1400 E. 9 MILE RD., DETROIT 20 (Ferndale) MICH.

*Builders* OF AUTOMATIC POLISHING AND BUFFING MACHINES FOR NEARLY HALF A CENTURY

**Protective Coatings.** A leaflet has been released by United Chromium, Incorporated, 100 E. 42nd St., New York 17, N. Y., showing how Ucilon Protective Coatings bar corrosion from a wide range of chemicals. Applicable with brush or spray gun, the pamphlet gives case histories where this coating has been used. One hundred different corrosives which this coating resists are listed. Also, thirteen Ucilon Systems, where they are used, their type, and materials used in them are shown.

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**Pumps, Heat Exchangers, and Floor Drains.** Nukem Products Corp., 110-120 Colgate Ave., Buffalo 20, N. Y., has available a brochure on Nu-Kast Pumps, Heat Exchangers, and Floor Drains. Made from cast resins, these products are acid and alkali-proof and are adaptable for heating pickling and plating baths, anodizing and cooling solutions, and many other uses. The resin pumps are light and portable and have a transfer range up to 100 g.p.m. at various heads. The heat exchangers are compact units with short straight runs and are said to be very flexible and versatile. Circulation of solutions is at high velocities with a temperature rise of 110 deg. F. being obtainable in 2½ hours.

Graphs which show the Head (in feet of water) vs. Flow (in g.p.m.) for the pumps, and a table showing the capacities of the various heat exchangers are included. Characteristics of this equipment, such as design, versatility, flexibility, and fittings, are discussed.

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**Murray-Way Polishing and Buffing Equipment.** The Murray-Way Corp., Box 180, Birmingham, Mich., has prepared a four-page brochure which describes and illustrates a representative group of standard and special-built equipment for automatic buffing and polishing. Special conveyor systems, bench and conveyor machines, fully automatic equipment and fixtures are pictured in this booklet.

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**Industrial Polishing.** The Schaffner Mfg. Co., Emsworth, Pa., has published a 12-page booklet describing modern techniques of industrial polishing and buffing as related to the varied buffs, polishes, and plating supplies the company manufactures. The booklet also serves as a catalog listing Schaffner products.


*Save Time, Labor, Dollars!*

TEST • STUDY • CONTROL
VISCOSITY
As Simply, Quickly and Easily as Taking Temperature Readings

Just a flick of a switch, then read the Brookfield dial, and you have your viscosity determination in centipoises. The whole operation, including cleaning up, *takes only a minute or two.*

Available in a variety of models suitable for extremely accurate work with both Newtonian and non-Newtonian materials, Brookfield Viscometers are portable and plug in any A.C. outlet—*can be used in Lab, Plant or both.*

Write today for fully illustrated catalog showing Brookfield Viscometers adaptable to any viscosity problem *from less than one to 32,000,000 centipoises.*

Brookfield ENGINEERING LABORATORIES, INC.
282 Porter St., Stoughton, Mass.

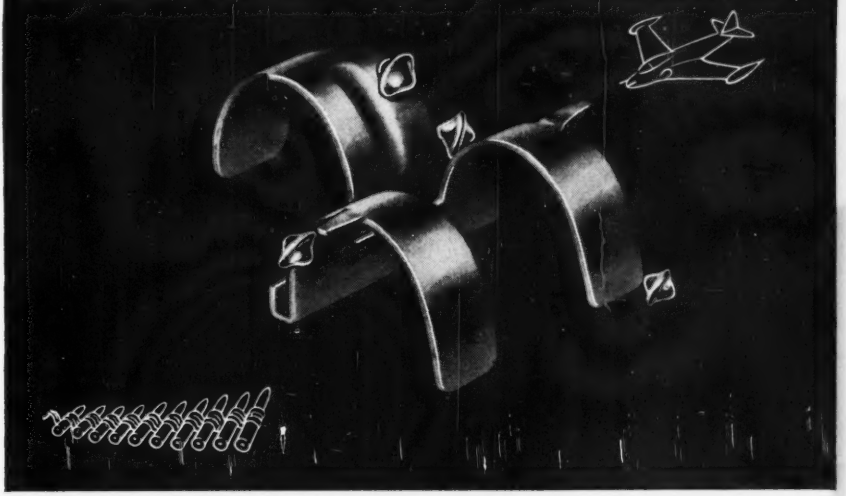
Looking for a Better Finish?
Try
HARRISON'S
4A
TAILOR-MADE
BUFFING & POLISHING COMPOUNDS
for
Aluminum, Brass, Copper, Stainless Steel, Carbon Steel, Etc.

EMERY CAKE, GREASE STICK

CEMENT AND THINNER
for setting up wheels, belts, and rolls

HARRISON & COMPANY, INC.
Haverhill, Massachusetts

# in BURNISHING MATERIALS



## *it's the SHAPE that counts!*

**Machine gun *cartridge links* — difficult to fabricate and finish — are often de-burred and burnished to rigid government specifications with Abbott Burnishing Materials. They're *shaped* to do the job right!**

**Abbott Burnishing Shapes — Ball, Ovalball, Cone, Diagonal, Pin — are scientifically designed to make effective contact on metal parts, stampings and castings of any size and shape. Each is made from Abbott's famed bearing ball steel, deep hardened and polished to a mirrorlike, glass hard finish . . . to guarantee superior burnishing results.**

**The Abbott Method of barrel finishing has solved many industrial problems for over forty years. Perhaps it can solve yours.**
***Write today for Abbott Catalog-Manual.***

ABBOTT
*the all round ball*

**THE ABBOTT BALL COMPANY**
**1064 New Britain Ave.**
**Hartford 10, Conn., U.S.A.**

The booklet contains dozens of helpful technical tips on how to get better results and success in metal and plastic polishing operations. It defines and explains "cutting down" and "coloring" operations in the buffing process; lists Schaffner compounds suitable for each material and each process; and includes an easy formula for determining the peripheral speed of polishing.

---

**Caustic Soda.** Pennsylvania Salt Manufacturing Company has issued a caustic soda bulletin prepared for all users of this important basic chemical. Divided into four sections under tabbed headings, the booklet provides handy reference for particular problems on purchasing, handling and storage, equipment design, and technical data.

Purchasing departments will find the comparison of various forms of caustic soda and the evaluation of shipping and ordering points helpful in selecting the form of this chemical most economical for use at their plants. The section on equipment design has been especially prepared to deal with the problems of engineering, construction, and maintenance personnel. Charts and tables showing freezing point, specific gravity at various temperatures, NaOH content and density, and other properties of caustic soda have been designed to give technicians and chemists readily-available answers to their particular questions. A separate leaflet covering instructions for safe handling of caustic soda tank cars is inserted in the flyleaf of the main bulletin. Detailed instructions for steaming and unloading 50 and 72 per cent caustic soda, as well as general information and personal precautions, are included.

Requests for the bulletin and leaflet should be written on company letterhead and addressed to Pennsalt Chemicals, 1000 Widener Building, Philadelphia 7, Pennsylvania.

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**Degreasing Equipment.** An illustrated bulletin describing the company's line of degreasing equipment has been published by Phillips Manufacturing Co., 3457 W. Touhy Ave., Chicago 45, Ill. The bulletin gives a detailed picture of how Phillips degreasers operate, what types of manufacturing industries use degreasers, and to what specific applications vapor degreasers can be put. The full line of vapor degreasers is shown along with the features, capacities, and uses of each specific type unit.

There are a number of photographs showing industrial applications of degreasers for both tank-type and conveyorized units. The degreasing process itself is explained for those who may not be completely familiar with it.

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**Water Treatment.** Brooks Chemicals, Inc., 3304 E. 87th St., Cleveland 27, Ohio, has published a 16-page booklet entitled **"Water Treatment and Water Conditioning,"** which gives considerable technical data and describes Brooks services, products, and methods employed in solving the many water problems encountered in industries, institutions, and governmental works. Included in the booklet is a study of ten impurities common in water, the damage they cause, and how to combat them.

---

**"Deoxidine" Selection Chart,** which lists various phosphoric acid metal cleaners and rust removers according to


PARAMOUNT BRAND

BOBS

ideal for burring

History is beginning to repeat itself. In connection with the past great war production program of American Industry, burr removal by felt bobs and wheels was a major item. For many operators this flexible method was the only way to remove burrs and yet hold to tolerances.

We have many types of felt bobs — both plain and mandrel mounted; also a large assortment of felt wheels. Or we can shape bobs and wheels to fit your requirements. Whatever size or shape, you will find Paramount Brand Felt Bobs or Wheels to be quality production tools.

BACON FELT COMPANY

ESTABLISHED 1825

TAUNTON MASSACHUSETTS

Your Supply House Can Furnish Bacon PARAMOUNT BRAND FELT BOBS & WHEELS

There is only *one* **PENTRATE** . . . the oldest name in black oxide finishing. Since 1923, it has stood as the leader in uniformity, dependability and quality. Discerning metal finishers have used over *twelve million* pounds. This label is your assurance of reliability and continuous research for an even better product — insist on it!

***Pentrate meets U. S. Gov. Spec. 57-0-2, Type III, Class A.***

**HEATBATH CORPORATION**

•

**SPRINGFIELD 1, MASSACHUSETTS**

strength, temperature limits, rust and oil removal, and so on, may be obtained from the American Chemical Paint Co., Ambler, Pa. The chart also gives concise information on the sequence of operation and equipment required in each process.

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**Featherweight Spray Gun.** The DeVilbiss Co., 300 Phillips Ave., Toledo 1, Ohio, has available a catalog sheet illustrating and listing the features, specifications, and general data concerning its Type TGA Featherweight Spray Gun, designed for a wide range of spray work requiring top finishing quality from touch-up of small spots to the refinishing of large objects.

Various models and nozzle combinations, together with the specific paints for which they were designed, are presented, and necessary accessories are listed.

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**Chromic Acid in Metal Finishing.** Diamond Alkali Co., 300 Union Commerce Bldg., Cleveland 14, Ohio, has published a 28-page booklet on chromic acid and its uses in the metal finishing industry. Included are information on chrome plating, anodizing, cleaning, stripping, chemical control methods, commercial grades of chromic acid, and various helpful tables regarding additions to chrome plating baths and chrome plating speeds.

---

**Enthox,** a process for producing iridescent, gold colored chromate finishes on zinc and cadmium, is the subject of literature prepared by Enthone, Inc., Dept. PF, 442 Elm St., New Haven, Conn. Details which are given on this conversion coating include operating instructions and prices, together with information on equipment required, surface preparation, "Enthox" solution and processing, drying, and a number of helpful notes.

Applicable to zinc plate, zinc base alloys and cadmium plate, the coating is highly resistant to corrosion, meets all necessary specifications and is a very good base for organic finishes.

---

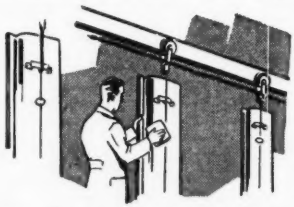
**Zahn Viscosimeter.** A new bulletin describing the G. E. Zahn Viscosimeter is now available from Henry A. Gardner


**FORM-A-ROC**
**FIRST-COAT**
**FOUNDATION**
**FOR FINE FINISH**

1. Dries with lacquer speed.
2. Has double lacquer solids at spray gun.
3. Fills very well—sands easily.
4. Adheres tenaciously to steel, wood, presdwood, aluminum, galvanized metal, etc.
5. Holds out lacquer, synthetic or oleoresinous enamels exceptionally well.
6. Thins 3:1 with xylol.
7. Available in GREY, SALMON and OFF-WHITE.
8. Ground well to smooth texture.

MADE BY
**The Varnish Products Company**
5208 Harvard Avenue Cleveland, Ohio

**DUST-ALL** Tack Rag
*for better, cleaner finished jobs*

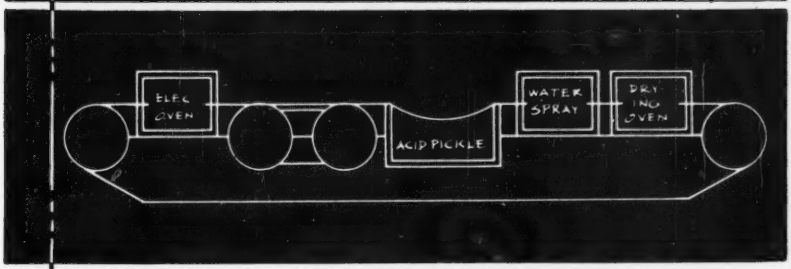


Remove the specks, lint, dust from surfaces to be painted; wipe them off with a Dust-All Tack Rag; be sure of fine, blemish-free, finished jobs.

*Get the Dust-All Tack Rag in the familiar Red Checkered Bag; also available in 150-250-500 yard rolls.*

**HARDING** *Manufacturing Co.*
10634 GRATIOT AVE.
DETROIT 13, MICH.

# NO MANPOWER PROBLEMS HERE




**4-STATION WIRE BELT CUTS HANDLING COSTS IN HALF, BOOSTS OUTPUT 25 TIMES!** In this specially designed installation, one woven wire conveyor belt carries metal dial faces through the four steps shown, in a continuous straight-line operation prior to porcelain enameling. Stainless steel used in constructing the belt will not form heat scale, resists corrosion from both the acid bath and the water rinse. Open mesh of the wire belt allows free heat circulation at end stations, free drainage of pickling solution and rinse water. Retaining cleats attached to the belt hold the dials in a vertical position, thus allowing maximum utilization of the belt surface.

***The results? 2 Operators can now produce over 100,000 parts in the time 4 operators formerly required to produce only 4000 parts!***

Perhaps you could speed production by combining product movement with processing on a woven wire belt. Why not call in your Cambridge field engineer today and let him explain all the advantages of . . .

## Cambridge Woven Wire Conveyor Belts

Write direct or call your nearest Cambridge office. See "Belting, Mechanical" in your classified telephone directory.

**FREE CONVEYOR BELT MANUAL gives woven wire belt design, specifications and construction. Also contains valuable installation diagrams and metallurgical data. Write for your copy of this valuable reference.**

## The Cambridge Wire Cloth Co.

**See us at the Metal Show BOOTH C-111**

Department A
Cambridge 10,
Maryland

OFFICES IN PRINCIPAL INDUSTRIAL CITIES

Laboratory, Inc., 4723 Elm Street, Bethesda 14, Maryland.

The bulletin lists the possible uses of the viscosimeter, its advantages and specifications, and methods af application. Also included are reference tables and charts for orifice selection.

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**H-VW-M Chrom-Flo Anodes.** Prepared by the Hanson-Van Winkle-Munning Co., Matawan, N. J., **Bulletin CFA-100** describes the Chrom-Flo chromium plating anode, a departure both in alloy and design which offers many attractive performance qualities. The use of special alloy lead Type "S" reduces the formation of insoluble chromate film on the anode. An open cross-section design makes higher current density possible because of better circulation of solution and increased anode surface exposure. Easier handling is possible because of decreased weight.

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**Nopco 1067-A**, a surfactant for use in pickling and other acid processes to prevent losses in carry-over and drain-off, is the subject of a technical service data sheet compiled by the Nopco Chemical Co., Harrison, N. J. Detailed data are given on its advantages, wetting ability, surface tension tests, its use in pickling, wire drawing, and anodizing, its appearance and handling. Also included is a graph showing the drainage rate of pickle acid with and without Nopco 1067-A.

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Behr-Manning, Troy, New York, Division of Norton Company, announces the availability of a new informative literature packet, **'Blueprints for Faster, Better Production."** Coated abrasive specialties and solid abrasive oilstone specialties designed for the metal finishing fields are described in detail.

Contained in a folding cover that can be expanded into a permanent wall chart, "blueprint" case study discussions of individual finishing problems and their solutions are graphically presented.

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**Automotive Rubber Catalog**. Automotive Rubber Co., Inc., 8601 Epworth Blvd., Detroit 4, Mich., long identified with the automotive, aircraft, electrical, chemical, and metal industries as a source for sheet rubber lined tanks and form-dipped rubber parts, sold under the "ARCO" trade name, has prepared a 12-page illustrated catalog which completely describes its plant facilities, including its new rubber compounding mill and various products and services which it now has to offer.

An expansion program now enables the company to offer molded and extruded products which are covered in the catalog.


YOU
can *rely* on
**RANDOLPH**
for prompt shipment
in any quantity of
***Performance - Proved Government Specification***
**FINISHES**
Lacquers • Enamels • Dopes • Thinners
Clear Metal Finishes • Colored Lacquers
Clear S.G. for Metal • Texture Enamels
Specialized Production Finishes
Aircraft Finishes
**RANDOLPH**
**PRODUCTS CO.**
CARLSTADT, NEW JERSEY



For further information on any product mentioned in this issue—use the READER SERVICE CARD between the covers.

**"CoCob."** Agri-Indus Mfg. Co., 1327 Huntington Bank Bldg., Columbus 15, Ohio, has available a news letter concerning its product, "CoCob." The release states that CoCob is a corn cob product, made by grinding, cleaning, and milling corn cobs into various sizes.

Among the uses that are listed are burnisher, polisher, dryer, conditioner, and filler. The letter also lists twelve characteristics, mesh sizes, colors, and economy of this product.

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**"How to Clean Metals in Aircraft Production"** is the title of a 48-page illustrated booklet, prepared by Oakite Products, Inc., 120 Thomas St., New York 6, N. Y., which describes specialized materials, procedures, and equipment for use in cleaning metals, preparing metals for finishing, and for other cleaning and related processes involved in aircraft production.

Based on actual, successful applications in leading aircraft manufacturing plants, the booklet reports in detail on specific materials and methods for performing a wide range of production cleaning and related operations. Among the many operations on which helpful data are provided are the following: preparing aluminum for anodizing; preparing aluminum for spot welding; preparation of aluminum for painting by still tank method and in spray washing machines; cleaning aluminum before and after heat treating; stripping paint from aluminum; cleaning magnesium for finishing; treating wash water in paint spray booths; cleaning aircraft metals for inspection and assembly; and many other operations.

Also presented in the booklet are helpful recommendations on equipment designed to simplify cleaning and rinsing operations, save manhours and materials, and help assure desired end results with maximum economy.

---

**Elgin Ultra-Deionizer. Bulletin 512** describes single-tank deionizers of mixed-bed, monoflo design which produce water of highest known chemical purity. Available from the Elgin Softener Corp., 134 N. Grove Ave., Elgin, Ill., the six-page bulletin includes engineering and technical data covering the range of sizes.


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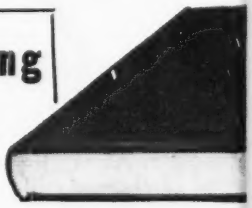

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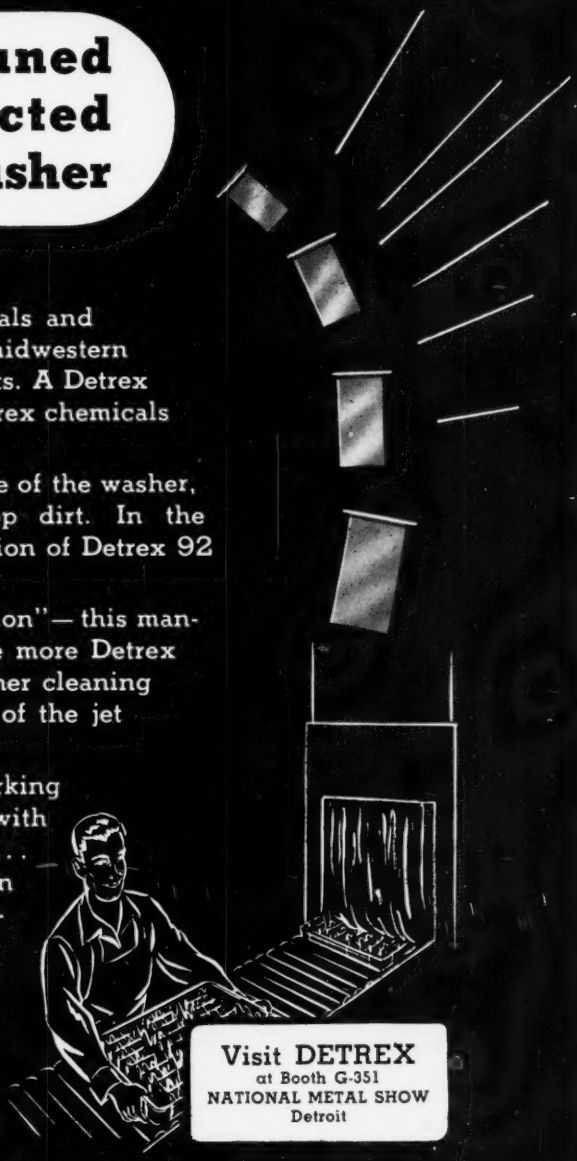

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